

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

6/Na
23

FEDERAL FINANCIAL AND OTHER
DIRECT AID TO THE STATES

FROM
"A NATIONAL PLAN FOR AMERICAN FORESTRY"

A Report Prepared by the Forest Service, U. S. Department of Agriculture
in Response to S. Res. 175 (72d Congress)

SENATE DOCUMENT No. 12 — SEPARATE No. 23



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1933

COPIES OF SENATE DOCUMENT 12, A NATIONAL PLAN FOR
AMERICAN FORESTRY, FROM WHICH THIS SEPARATE HAS BEEN
REPRINTED, ARE ON SALE BY THE SUPERINTENDENT OF DOCU-
MENTS, WASHINGTON, D.C. PRICE \$1.75. REMITTANCE
SHOULD BE MADE BY MONEY ORDER.

FEDERAL FINANCIAL AND OTHER DIRECT AID TO STATES

By A. B. HASTINGS, in charge of State cooperation

CONTENTS

	Page
Federal aid in forest-fire protection.....	1054
Federal aid in farm forest planting.....	1076
Cooperation with States in farm forestry extension.....	1081
Federal aid to States for roads.....	1087
Federal land grants to States.....	1088
Federal aid to State agricultural colleges and experiment stations.....	1092
Vocational education.....	1093

The Senate resolution in response to which this report has been prepared specifically raised the question of Federal aid to the States. It is therefore fitting to outline the purposes and accomplishments of Federal aid insofar as they relate to forestry interests, in order that this form of activity may be properly appraised as a means of solving our forestry problems, now and in the future.

To summarize the status of Federal aid to States in its present financial perspective, a list of current projects is given in table 1. The total of the appropriations as shown is more than \$180,000,000, and while there is no assurance that the list is complete, sufficient care has been taken to cover the major items.

TABLE 1.—Federal aid appropriations for the States for the fiscal year 1933

Project	Amount	Percent
Forest-fire prevention.....	\$1, 611, 580	0. 88
Distribution of nursery stock.....	79, 960	. 04
Forestry extension.....	69, 850	. 04
Highways.....	125, 000, 000	68. 60
State fund from sale of public lands ¹	26, 185	. 01
Support of agricultural colleges.....	2, 550, 000	1. 40
Support of experiment stations.....	4, 374, 000	2. 40
Cooperative agricultural extension work.....	5, 760, 170	3. 16
Vocational education.....	8, 414, 853	4. 62
Vocational rehabilitation.....	1, 089, 858	. 60
National Guard.....	31, 263, 565	17. 16
Maternity and infant hygiene ²	776, 576	. 42
State fund under oil-leasing act ¹	1, 213, 562	. 67
Total.....	182, 230, 159	100. 00

¹ Amount expended in fiscal year 1932.

² Amount expended in fiscal year 1929.

It is impressive to note that the sums appropriated directly to forestry work in 1933 constitute less than 1 percent of the total. Although such a ratio may roughly represent popular appreciation of the need of aid to the States in forestry, it quite certainly fails to measure the need in any real sense.

In the discussion that follows, first attention will be centered on the three specific forestry activities shown—fire prevention, distribution of nursery stock, and forestry extension. Several other activities, having rather close relationships to forestry, will then be taken up in order.

FEDERAL AID IN FOREST-FIRE PROTECTION

THE WEEKS LAW

(Act of Mar. 1, 1911; 36 Stat. 961)

The Weeks law was the first of the present-day Federal aid measures enacted by Congress which embodied the condition of equal sharing of expenditure by the States. Various forms of land grants had, of course, been made long before this. Measures had also been taken by Congress in support of State colleges of agriculture and of agricultural experiment stations. By the passage of the Weeks law a lump sum of \$200,000 was made available until expended—

to enable the Secretary of Agriculture to cooperate with any State or group of States, when requested to do so, in the protection from fire of the forested watersheds of navigable streams; and the Secretary of Agriculture is hereby authorized, and on such conditions as he deems wise, to stipulate and agree with any State or group of States to cooperate in the organization and maintenance of a system of fire protection on any private or State forest lands within such State or States and situated upon the watershed of a navigable river: *Provided*, That no such stipulation or agreement shall be made with any State which has not provided by law for a system of forest fire protection: *Provided further*, That in no case shall the amount expended in any State exceed in any fiscal year the amount appropriated by that State for the same purpose during the same fiscal year.

During the fiscal year 1911, cooperation was undertaken with 11 States under this act. The number increased steadily to a total of 29 States in 1925, and meanwhile additional appropriations were made under the act. During the calendar year 1911, \$36,692 Federal, \$165,975 State, and \$54,590 private money was expended upon the protection of approximately 60,779,000 acres of forested watersheds. In the fiscal year 1925, the last year prior to cooperation under the Clarke-McNary law, the corresponding amounts spent were \$397,651 Federal and \$1,844,192 State and private. Combined expenditures under the Weeks law were thus increased nearly tenfold from 1911 to 1925, and the area of forest land under cooperative protection in 1925 was three times that in 1911.

THE CLARKE-McNARY LAW

(Act of June 7, 1924; 43 Stat. 653)

This act continued the Federal cooperation started with the States under the Weeks law, which was superseded in that respect. It removed the limitation of protection to forested watersheds of navigable streams, provided for cooperation through the States with private forest owners, and added the important provisions contained in sections 3, 4, and 5—for forest taxation studies, for cooperation with the States in the production and distribution of forest planting stock for windbreaks, shelter belts, and farm wood lots, and for cooperation in farm forestry extension.

The following are the provisions of sections 1, 2, and 3 of the Clarke-McNary law:

That the Secretary of Agriculture is hereby authorized and directed, in cooperation with appropriate officials of the various States or other suitable agencies, to recommend for each forest region of the United States such systems of forest fire prevention and suppression as will adequately protect the timbered and cut-over lands therein with a view to the protection of forest and water resources and the continuous production of timber on lands chiefly suitable therefor.

SEC. 2 (as amended by act of Mar. 3, 1925, 43 Stat., 1127, and act of Apr. 13, 1926, 44 Stat. 242). That if the Secretary of Agriculture shall find that the system and practice of forest fire prevention and suppression provided by any State substantially promotes the objects described in the foregoing section, he is hereby authorized and directed, under such conditions as he may determine to be fair and equitable in each State, to cooperate with appropriate officials of each State, and through them with private and other agencies therein, in the protection of timbered and forest-producing lands from fire. In no case other than for preliminary investigations shall the amount expended by the Federal Government in any State during any fiscal year, under this section, exceed the amount expended by the State for the same purpose during the same fiscal year, including the expenditures of forest owners or operators which are required by State law or which are made in pursuance of the forest protection system of the State under State supervision, and the Secretary of Agriculture is authorized to make expenditures on the certificate of the State forester, the State director of extension, or similar State official having charge of the cooperative work for the State that State and private expenditures as provided for in this Act have been made. In the cooperation extended to the several States due consideration shall be given to the protection of watersheds of navigable streams, but such cooperation may, in the discretion of the Secretary of Agriculture, be extended to any timbered or forest producing lands or watersheds from which water is secured for domestic use or irrigation within the cooperating States.

SEC. 3. That the Secretary of Agriculture shall expend such portions of the appropriations authorized herein as he deems advisable to study the effects of tax laws, methods, and practices upon forest perpetuation, to cooperate with appropriate officials of the various States or other suitable agencies in such investigations and in devising tax laws designed to encourage the conservation and growing of timber, and to investigate and promote practical methods of insuring standing timber on growing forests from losses by fire and other causes. There is hereby authorized to be appropriated annually, out of any money in the Treasury not otherwise appropriated, not more than \$2,500,000 to enable the Secretary of Agriculture to carry out the provisions of sections 1, 2, and 3 of this Act.

This law was passed after a special Senate committee had made an exhaustive study of forestry needs. It was an attempt to advance the protection of forest and water resources and to provide conditions under which the practice of forestry by private owners would be freed from excessive handicaps, so that it could be undertaken profitably by the owner to the advantage of the Nation. Under the authorization of \$2,500,000 annually, an initial appropriation for cooperation with the States in forest fire protection was made for the fiscal year 1926 in the amount of \$660,000. For the succeeding fiscal years, appropriations have been made as follows: 1927, \$710,000; 1928, \$1,000,000; 1929, \$1,209,802; 1930, \$1,400,000; 1931, \$1,700,000; 1932, \$1,775,000. As an economy measure, a saving was made in the 1932 appropriation, so that the actual provision was \$1,612,600.

The total amounts of Federal, State, and private money expended under these two acts from March 1, 1911, to June 30, 1932, including the amount spent for the investigations of forest taxation and forest insurance, are the following:

Weeks law	\$2, 431, 378	
Clarke-McNary law	8, 355, 819	
Total Federal		\$10, 787, 197
State and private under Weeks law	\$12, 380, 607	
State and private under Clarke-McNary law	24, 256, 679	
Total State and private		36, 637, 286
Grand total		47, 424, 483

ADMINISTRATION OF THE ACTS

From the start the plan followed in the administration of the Weeks and Clarke-McNary laws by the Forest Service has been based upon the principle that the fire-protection work in each State would be supervised and carried through by the State. State laws govern the handling of fire and other trespass on State and private lands, the protection of which is under discussion. State and private money must be depended upon to carry most of the load. The projects are therefore conducted under State plans, which, upon approval by the Federal Government, are jointly developed by the State forester and the Federal Forest Service. Annual budgets to carry out these plans are submitted to the Forest Service for approval, as are the later reports of expenditures which form the basis for Federal reimbursement to the States.

To protect the Federal interest and to give full advantage to the States of the experience of the Forest Service and other States, Federal inspection districts corresponding in general to the forest regions have been established, with a district forest inspector in each. The inspectors in the East with headquarters at Amherst, Mass.; Washington, D.C.; Asheville, N.C.; New Orleans, La.; and Louisville, Ky.; report directly to the Washington office. The inspectors in the West report to the regional foresters at Missoula, Mont.; Denver, Colo.; Albuquerque, N.Mex.; Ogden, Utah; San Francisco, Calif.; Portland, Oreg.; and Milwaukee, Wis. These inspectors keep in close touch with each State project in the field.

As a part of the fire plan for each State, careful estimates of areas in need of protection, a layout of the organization, improvements, etc., needed to accomplish adequate protection, and estimates of the cost of such protection have been formulated. The estimates of areas and costs as of 1930 are shown on table 2, columns 2 and 3. The Clarke-McNary law itself, in its authorization of Federal appropriations of \$2,500,000 a year, presupposed an annual cost of approximately \$10,000,000 as necessary to protect the State and private land in all States. The 1930 revision of this cost was \$13,386,273. Comparative studies and analyses made in the section of this report covering Protection Against Fire indicate that if protection of all forest areas adequate to meet the standards as therein set up is to be attained within the next 10 or 15 years the annual cost would be considerably greater.

GENERAL RESULTS

FEDERAL AID AS A STIMULUS TO STATES IN ESTABLISHING AND DEVELOPING FORESTRY DEPARTMENTS

Up to 1911, when the Weeks Act was passed, only 16 States had appropriated money to engage in the protection of forests from fire. Upon passage of the act, 11 of these immediately entered into agreements with the Federal Government to cooperate in forest fire protection. The number of States cooperating in this activity in 1932 was 38, including all the original 16 and 22 others. The organized protection of privately owned forest land is known to have been initiated in at least 17 of the 22 additional States as a direct result of Federal cooperation. It is believed that in many of them forest protection would have been much longer delayed if Federal aid had not been available.

TABLE 2.—Progress in protection of State and private forest land as shown by area and cost of acreage protected in calendar year 1915 and 1931, as compared with acreage needing protection

Regions and States (1)	Acreage needing protection ¹			Acreage protected 1915 and 1931			Cost per acre 1931 (10)
	Forest area (2)	Total ¹ cost (3)	Cost per acre (4)	Area 1931		Expendi- tures 1915 (8)	Expendi- tures 1931 (9)
				Area 1915 * (5)	(6)	(7) ⁴	
New England:							
Connecticut.....	Acres 1,500,000	Dollars 76,000	Cents 5.07	Acres 1,443,000	Acres 1,500,000	Percent 100	Dollars 71,195
Maine.....	14,957,000	342,000	2.29	9,500,000	15,000,000	100	223,155
Massachusetts.....	3,300,000	169,000	5.12	2,500,000	3,300,000	100	130,930
New Hampshire.....	4,259,000	131,000	3.08	3,500,000	4,254,000	99	59,385
Rhode Island.....	280,000	17,000	6.07	-----	280,000	100	7,287
Vermont.....	3,375,000	57,000	1.69	2,000,000	3,750,000	111	19,379
Total.....	27,671,000	792,000	2.86	18,943,000	28,084,000	101	511,331
Middle Atlantic:							
Delaware.....	325,000	12,000	3.69	-----	350,000	107	7,837
Maryland.....	2,200,000	73,000	3.32	2,000,000	2,223,000	101	88,677
New Jersey.....	1,906,000	128,000	6.72	1,800,000	1,890,000	99	149,441
New York.....	11,689,000	378,000	3.23	7,200,000	10,265,000	88	305,835
Pennsylvania.....	12,365,000	364,000	2.94	-----	12,627,000	102	614,069
Total.....	28,485,000	955,000	3.35	11,000,000	27,355,000	96	1,165,859
Lake							
Michigan.....	18,596,000	662,000	3.56	12,000,000	19,416,000	104	748,817
Minnesota.....	20,523,000	697,000	3.40	14,250,000	21,310,000	104	535,711
Wisconsin.....	13,187,000	390,000	2.96	5,000,000	13,374,000	101	384,260
Total.....	52,306,000	1,749,000	3.34	31,250,000	54,100,000	103	1,668,788
Central:							
Illinois.....	2,750,000	77,000	2.80	-----	538,000	20	13,600
Indiana.....	3,000,000	84,000	2.80	-----	300,000	10	15,118
Kentucky.....	9,000,000	212,000	2.36	5,000,000	1,321,000	15	39,018
Missouri.....	15,750,000	347,000	2.20	-----	-----	-----	-----
Ohio.....	2,160,000	60,000	2.78	-----	1,040,000	48	20,102
Tennessee.....	10,430,000	245,000	2.35	-----	6,967,000	67	45,357
West Virginia.....	9,251,000	312,000	3.37	4,450,000	5,835,000	63	117,083
Total.....	52,341,000	1,337,000	2.55	9,450,000	16,001,000	31	250,278

¹ 1930 estimates.

⁴ Percents over 100 are due to areas protected in excess of 1930 estimates of areas needing protection

TABLE 2.—Progress in protection of State and private forest land as shown by area and cost of acreage protected in calendar year 1915 and 1931, as compared with acreage needing protection—Continued

Regions and States (1)	Acreage needing protection ¹			Acreage protected 1915 and 1931					
	Forest area (2)	Total cost (3)	Cost per acre (4)	Area 1915 (5)	Area 1931		Expendi- tures 1915 (8)	Expendi- tures 1931 (9)	Cost per acre 1931 (10)
					(6)	(7) ⁴			
South:	Acres	Dollars	Cents	Acres	Acres	Percent	Dollars	Dollars	Cents
Alabama	22,386,000	573,000	2.56		9,613,000	43		88,037	.9
Arkansas	22,000,000	484,000	2.20		3 4,206,000	19			
Florida	22,900,000	847,000	3.70		1,319,000	6		147,149	11.1
Georgia	23,100,000	775,000	3.35		1,653,000	7		102,087	6.2
Louisiana	17,900,000	434,000	2.42		5,567,000	31		135,758	2.4
Mississippi	19,500,000	563,000	2.89		520,000	3		52,168	10.0
North Carolina	20,568,000	632,000	3.07		7,594,000	37	2,339	109,552	1.4
Oklahoma	12,388,000	165,000	1.33		1,312,000	11		35,927	2.7
South Carolina	12,500,000	378,000	3.02		607,000	5		70,759	11.6
Texas	15,657,000	434,000	2.77		7,209,000	46		102,162	1.4
Virginia	14,005,000	397,000	2.83		8,583,000	61	1,878	100,356	1.2
Total	202,904,000	5,682,000	2.80		48,183,000	24	4,217	943,955	2.1
Pacific Coast:									
California	18,955,000	969,000	5.11		11,746,000	62		977,759	8.3
Oregon	10,685,000	584,000	5.47	11,586,000	13,592,000	127	129,228	579,375	4.3
Washington	12,080,000	632,000	5.23	7,500,000	10,563,000	87	85,985	502,503	4.7
Total	41,720,000	2,185,000	5.24	19,086,000	35,901,000	86	215,213	2,059,637	5.7
North Rocky Mountain:									
Idaho (north)	3,843,000	420,000	10.93	}	5,384,000	117	{ 99,186 3,345	429,526	}
Idaho (south)	758,000	27,000	3.56						
Montana	4,854,000	190,000	3.91	1,700,000	7,282,000	150	8,557	147,070	2.0
Total	9,455,000	637,000	6.74	4,900,000	12,666,000	134	111,088	603,863	4.8
South Rocky Mountain:									
Arizona					3 383,000				
Colorado					3 793,000				
Nevada	2 315,000	13,600	4.32		533,000	169		7,853	1.5
New Mexico	1,800,000	26,000	1.44		1,375,000	76		5,331	4.4
South Dakota	79,000	4,500	5.70	49,000	171,000	217	2,596	3,976	2.3
Utah					3 96,000				
Wyoming					3 170,000				
Total	2,194,000	44,100	2.01	49,000	3,521,000	95	2,596	17,160	.8
Hawaii	2 2,557,000	5,173	.20		1,800,000	70		1,017	.1
Grand total	419,633,000	13,386,273	3.19	94,678,000	227,611,000	54	983,917	7,221,888	3.3

¹ 1930 estimates.
² 1931 estimates.
³ Eliminated from totals used to determine cost per acre and percent protected for groups of States and for all States.
⁴ Percents over 100 are due to areas protected in excess of 1930 estimates of areas needing protection.

COVERAGE OF FOREST AREAS BY SOME DEGREE OF ORGANIZED PROTECTION

The acreages covered in the extension of systematic protection to the area needing protection are indicated for the years 1912 to 1931 in figure 1. The average annual gain in area of State and private forest land under some form of systematic protection from 1912 to

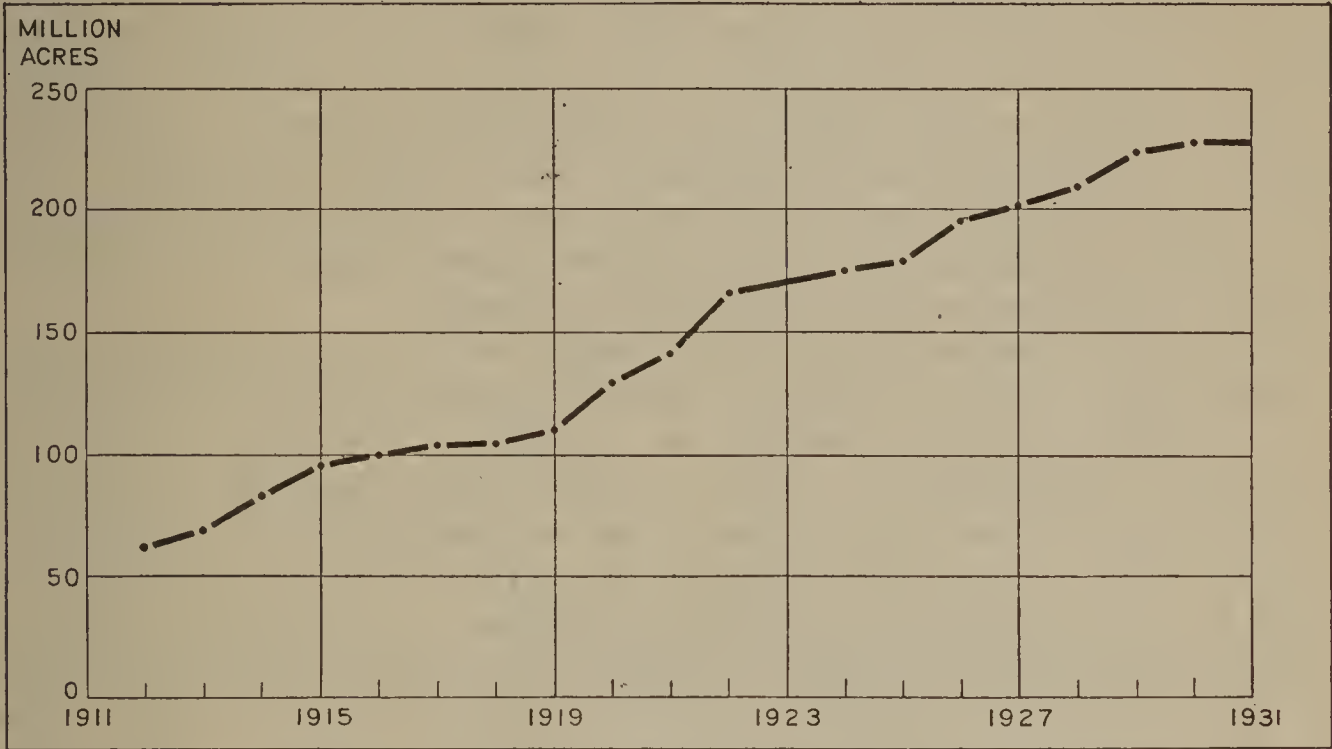


FIGURE 1.—Forest area in State and private ownership under cooperative fire protection.

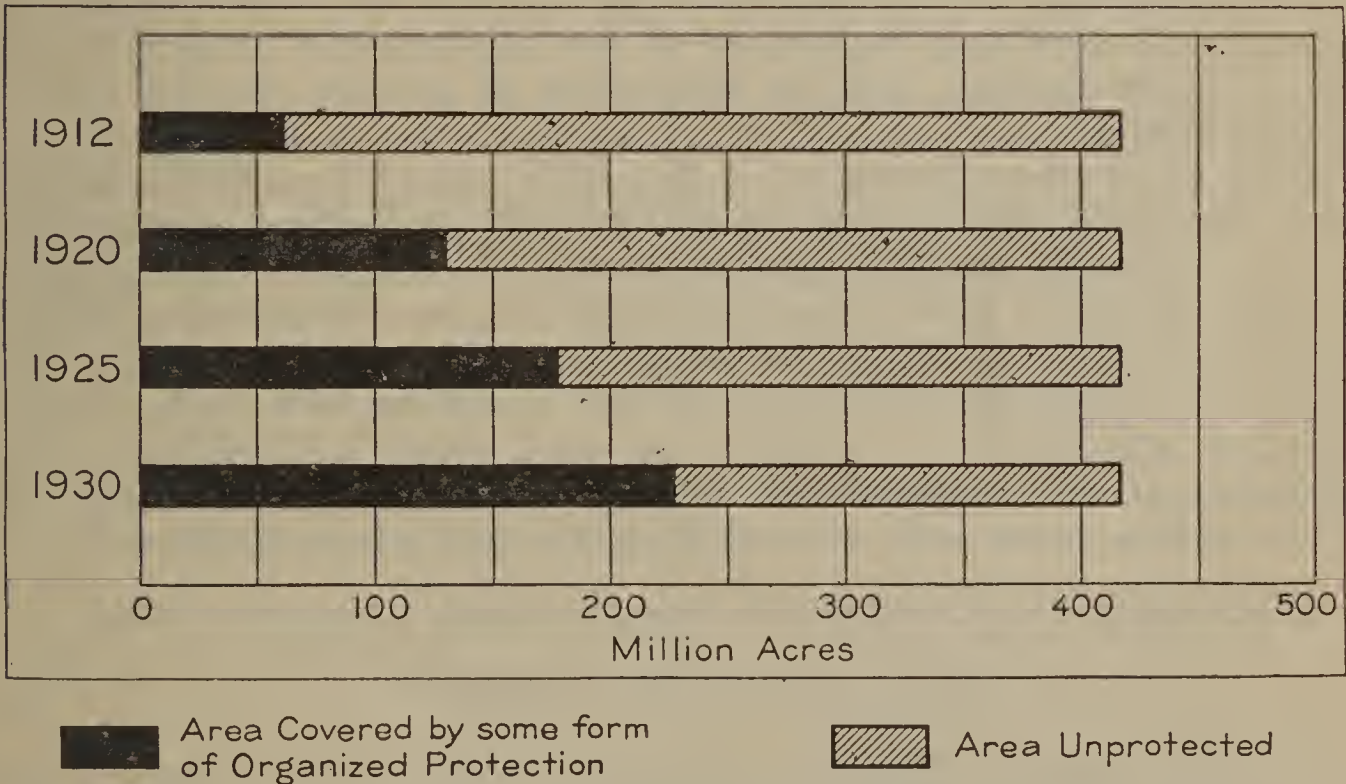


FIGURE 2.—Progress in protection of State and private forest land from fire on basis of area.

1931 was 8,781,000 acres. If this rate of progress were continued, and if it is assumed that the total area to be covered is 420,000,000 acres, complete coverage would be attained at this rate in 22 years. If we take the period 1925–30, the average annual gain indicated is 9,870,000 acres, and the time required for complete coverage is 19 years. This periodic progress is shown in relation to the estimated need in figure 2.

A study of table 2, columns 5 and 6, will disclose the striking contrast between the areas protected in 1915 and in 1931. The percentage of total coverage increased from 23 to 54. But forecasts based on total or average progress to date mean little. It is more significant to consider what may happen in the particular areas where increases in protection, if any, must occur. Column 7 of table 2 indicates by States and groups of States the extent to which forest areas needing protection were covered by some form of systematic protection in the calendar year 1931.¹ The New England, Middle Atlantic, Lake States, north Rocky Mountain, south Rocky Mountain, and Pacific coast regions are shown with already practically complete coverage of all forest areas that need protection. Two important groups, however, are shown to be deficient—the Central group, with 31 percent coverage of forest areas classed as in need of protection, and the South, with only 24 percent.

In these two groups complete coverage will not be secured within 20 years under present forms of organized effort unless the average rate of progress for the country as a whole is brought to bear on these groups specifically. This is particularly true in the South. Such organized protection as has been accomplished in that region has been built up around holdings of owners who have aggressive interest in the protection of their properties. To increase or even to sustain the rate of progress, steadily increased support will have to be provided by the States and the Federal Government. This development will take different forms in different States. The effort to obtain greatly increased public participation must be accompanied by intensive study of the effects of fire in different forest types, by clear-cut definition and exposition of the fundamental benefits to be secured by protection, and by education of private owners and of the local public.

In this connection, however, it should be noted that the 11 States in the Southern region, prior to the advent of Federal cooperation, and even as lately as 1915, had no area under organized protection. For these States to have placed 48 million acres under some form of organized protection within 16 years is a major achievement. The cooperative approach to the protection problem in the South has succeeded admirably in getting the first steps undertaken. The establishment of a satisfactory degree of State-wide protection on the 155 million acres still without it is the task which lies ahead.

PROGRESS IN FINANCING PROTECTION UNDERTAKING

FINANCIAL RECORD IN BRIEF

The curve shown in figure 3 indicates roughly the increase in total funds spent, Federal, State, and private, upon this work from 1911 to 1931. The average annual gain over the 21-year period is \$345,670. If this same rate of increase in funds spent upon the work were maintained, the amount of \$13,386,273, which was set up by the 1930 estimates already referred to, would be reached in 17 years. The contrasts between expenditures of 1915 and 1931 are shown in detail, in table 2, columns 8 and 9.

¹ It is to be noted that the number of acres of State and private forest land needing protection is necessarily a different figure from the total State and private forest area. In many States there are considerable areas of privately-owned forest land that are not classed as in need of organized protection. These are isolated tracts of low fire hazard on individual farms, estates, or properties, the protection of which logically devolves on the resident owners, caretakers, or operators.

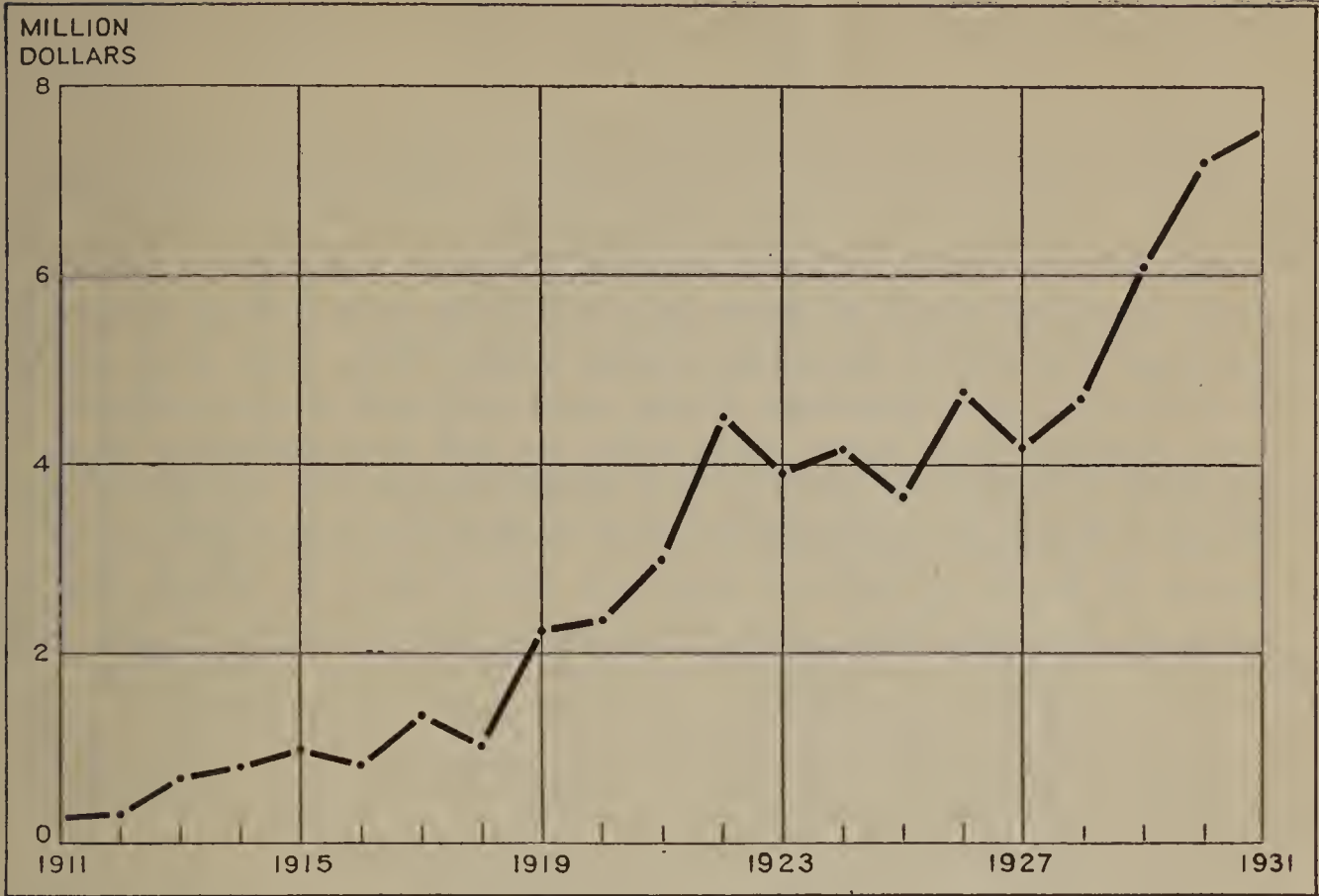
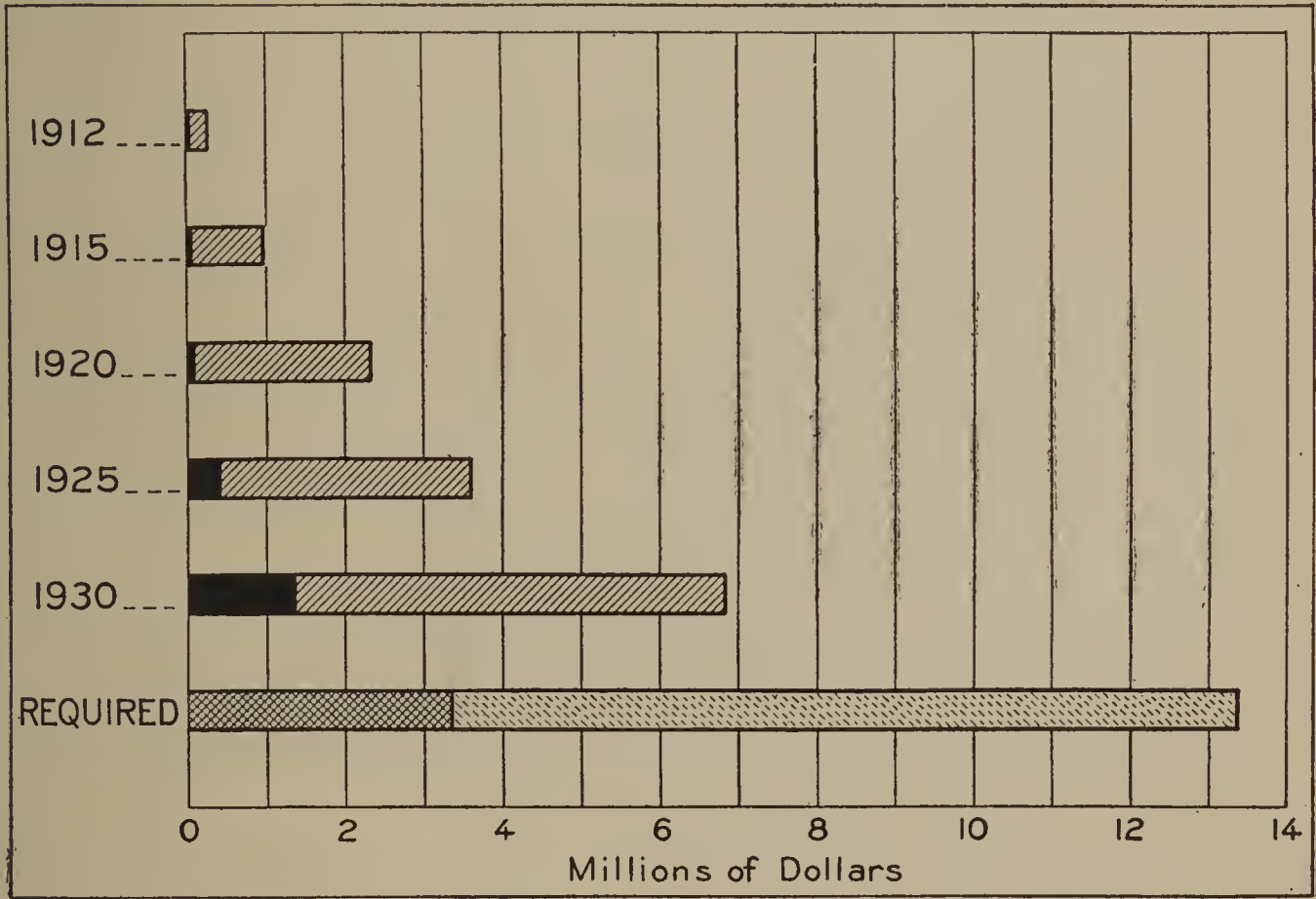


FIGURE 3.—Total annual expenditures (all agencies) in cooperative fire protection of State and privately owned land.



■ Federal Cooperative Expenditure
▨ State and Private Expenditure
▩ Total Federal Cooperative Expenditure Required
▤ Total State and Private Expenditure Required

FIGURE 4.—Progress in protection of State and private forest land from fire on basis of expenditure, and estimated expenditure required (1930 estimate) for adequate protection.

Table 3 shows the financial part played by the several cooperating agencies during the fiscal year 1932 by States and groups of States. (To consider the respective shares of the contributing agencies, it is necessary to pass from the calendar-year basis of table 2 to a fiscal-year basis.)

The total expended by all agencies during the fiscal year 1932 on the cooperative forest fire protection project, \$5,943,103 (see table 3, column 10), is larger than any previous fiscal year total except that for the fiscal year 1931, which was \$6,710,103. Figure 4 indicates the steady upward trend of these expenditures over 5-year intervals. The decrease for 1932, in comparison with 1931, was due to the general difficulty of financing State and private undertakings encountered during that year, and also to the comparative ease of handling fires during the year. The total budget for the fiscal year 1933 shows a further moderate decline under the same influences.

Columns 12 to 16 of table 3 indicate the extent to which the expenditures of the last fiscal year come up to the amounts of the 1930 estimates of what is necessary to give adequate protection. In column 16 it may be seen that only a little over 44 percent of expenditures thus classed as adequate was actually made by all agencies taken together—about 12 percent representing the Federal part and the balance the part of the States and private owners.

TABLE 3.—Distribution of Federal, State and private expenditures for forest fire protection, fiscal year 1932, and relation to 1930 estimates of adequate expenditures

Regions and States	Percentage of adequate amount expended by—															
	Federal		State		Private		Total State and private		Total Federal, State, and private	Estimated cost of adequate protection	by—					
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)			(10)	(11) ¹	(12)	(13)	(14)	(15)
(1)	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Dollars	Percent	Percent	Percent	Percent	Percent	Percent
New England:																
Connecticut	14,008	16.35	68,246	79.63	3,446	4.02	71,692	83.65	85,700	76,000	18.43	89.80	4.53	94.33	112.76	
Maine	54,732	24.39	169,674	75.61			169,674	75.61	224,406	342,000	16.00	49.61		49.61	65.61	
Massachusetts	34,991	33.28	70,154	66.72			70,154	66.72	105,145	169,000	20.71	41.51		41.51	62.22	
New Hampshire	18,012	32.73	30,393	55.22			37,025	67.27	55,037	131,000	13.75	23.20	5.06	28.26	42.01	
Rhode Island	2,410	22.28	8,409	77.72			8,409	77.72	10,819	17,000	14.18	49.46		49.46	63.64	
Vermont	7,894	40.14	8,054	40.96			11,770	59.86	19,664	57,000	13.85	14.13	6.52	20.65	34.50	
Total	132,047	26.37	354,930	70.88	13,794	2.75	368,724	73.63	500,771	792,000	16.67	44.82	1.74	46.56	63.23	
Middle Atlantic:																
Delaware	1,318	9.90	11,995	90.10			11,995	90.10	13,313	12,000	10.98	99.96		99.96	110.94	
Maryland	12,203	16.08	63,388	83.51			63,700	83.92	75,903	73,000	16.72	86.83	.43	87.26	103.98	
New Jersey	28,140	17.29	134,621	82.71			134,621	82.71	162,761	128,000	21.99	105.17		105.17	127.16	
New York	77,191	21.38	281,743	78.05			283,793	78.62	360,984	378,000	20.42	74.54	.54	75.08	95.50	
Pennsylvania	54,314	12.74	371,996	87.26			371,996	87.26	426,310	364,000	14.92	102.20		102.20	117.12	
Total	173,166	16.66	863,743	83.11	2,362	.23	866,105	83.34	1,039,271	955,000	18.13	90.44	.25	90.69	108.82	
Lake States:																
Michigan	131,320	20.05	523,799	79.95			523,799	79.95	655,119	662,000	19.84	79.12		79.12	98.96	
Minnesota	98,443	20.44	360,965	74.95			383,181	79.56	481,624	697,000	14.12	51.79	3.19	54.98	69.10	
Wisconsin	48,983	11.93	361,597	88.07			361,597	88.07	410,580	390,000	12.56	92.72		92.72	105.28	
Total	278,746	18.01	1,246,361	80.55	22,216	1.44	1,268,577	81.99	1,547,323	1,749,000	15.94	71.26	1.27	72.53	88.47	
Central:																
Illinois										77,000						
Indiana	7,560	42.40	10,271	57.60			10,271	57.60	17,831	84,000	9.00	12.23		12.23	21.23	
Kentucky	18,780	50.00	18,780	50.00			18,780	50.00	37,560	212,000	8.86	8.86		8.86	17.72	
Missouri										347,000						
Ohio	7,491	40.98	10,787	59.02			10,787	59.02	18,278	60,000	12.48	17.98		17.98	30.46	
Tennessee	25,320	46.59	25,211	46.39			29,027	53.41	54,347	245,000	10.33	10.29	1.56	11.85	22.18	
West Virginia	31,348	35.04	42,871	47.92			58,118	64.96	89,466	312,000	10.05	13.74	4.89	18.63	28.68	
Total	90,499	41.61	107,920	49.62	19,063	8.77	126,983	58.39	217,482	1,337,000	6.77	8.07	1.43	9.50	16.27	

¹ 1930 estimates.

TABLE 3.—Distribution of Federal, State and private expenditures for forest fire protection, fiscal year 1932, and relation to 1930 estimates of adequate expenditures—Continued

Regions and States	Percentage of adequate amount expended by—																			
	Federal		State		Private		State and private		All agencies		Estimated cost of adequate protection	Total Federal, State, and private	Total State and private	(10)	(11) ¹	Federal	State	Private	State and private	All agencies
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(12)	(13)										
(1)	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
South:																				
Alabama	40,253	49.96	9,172	11.39	31,141	38.65	40,313	50.04	80,566	573,000	7.02	1.60	5.44	7.04	14.06					
Arkansas	65,826	49.99	35,609	27.05	30,234	22.96	65,843	50.01	131,669	847,000	7.77	4.20	3.57	7.77	15.54					
Florida	57,690	50.00	22,712	19.68	34,978	30.32	57,690	50.00	115,380	775,000	7.45	2.93	4.51	7.44	14.89					
Georgia	51,810	35.07	62,711	42.46	33,196	22.47	95,907	64.93	147,717	434,000	11.94	14.45	7.65	22.10	34.04					
Louisiana	18,735	50.00	17,296	46.16	1,438	3.84	18,734	50.00	37,469	563,000	3.33	3.07	.26	3.33	6.66					
Mississippi	50,091	50.00	40,824	40.75	9,266	9.25	50,090	50.00	100,181	632,000	7.93	6.46	1.47	7.93	15.86					
North Carolina	16,670	49.67	15,890	47.35	1,000	2.98	16,890	50.33	33,560	165,000	10.10	9.63	.61	10.24	20.34					
Oklahoma	28,979	45.58	16,434	25.85	18,168	28.57	34,602	54.42	63,581	378,000	7.67	4.35	4.80	9.15	16.82					
South Carolina	42,205	41.16	46,496	45.34	13,843	13.50	60,339	58.84	102,544	434,000	9.73	10.71	3.19	13.90	23.63					
Texas	35,730	40.62	46,197	52.52	6,039	6.86	52,236	59.38	87,966	397,000	9.00	11.64	1.52	13.16	22.16					
Virginia																				
Total	407,989	45.30	313,341	34.79	179,303	19.91	492,644	54.70	900,633	5,682,000	7.18	5.51	3.16	8.67	15.85					
Pacific Coast:																				
California	170,498	25.01	159,333	23.38	351,731	51.61	511,064	74.99	681,562	969,000	17.60	16.44	36.30	52.74	70.34					
Oregon	104,092	37.06	44,158	15.72	132,624	47.22	176,782	62.94	280,874	584,000	17.82	7.56	22.71	30.27	48.09					
Washington	111,543	37.71	94,607	31.98	89,645	30.31	184,252	62.29	295,795	632,000	17.65	14.97	14.18	29.15	46.80					
Totals for region	386,133	30.69	298,098	23.69	574,000	45.62	872,098	69.31	1,258,231	2,185,000	17.67	13.64	26.27	39.91	57.58					
North Rocky Mountain:																				
Idaho (North)	64,041	18.57	66,624	19.32	214,158	62.11	280,782	81.43	344,823	420,000	15.25	15.86	50.99	66.85	82.10					
Idaho (South)	5,210	22.35	8,145	34.94	9,955	42.71	18,100	77.65	23,310	27,000	19.29	30.17	36.87	67.04	86.33					
Montana	30,145	32.96	11,564	12.64	49,764	54.40	61,328	67.04	91,473	190,000	15.86	6.09	26.19	32.21	48.14					
Total	99,396	21.63	86,333	18.78	273,877	59.59	360,210	78.37	459,606	637,000	15.60	13.55	43.00	56.55	72.15					
South Rocky Mountain																				
Nevada	1,220	17.38	105	1.50	5,695	81.12	5,800	82.62	7,020	13,600	8.97	.77	41.88	42.65	51.62					
New Mexico	2,042	24.20	2,762	32.74	3,633	43.06	6,395	75.80	8,437	26,000	7.86	10.62	13.97	24.59	32.45					
South Dakota	1,125	48.10	1,214	51.90			1,214	51.90	2,339	4,500	25.00	26.98		26.98	51.98					
Total	4,387	24.65	4,081	22.93	9,328	52.42	13,409	75.35	17,796	44,100	9.95	9.25	21.15	30.40	40.35					
Hawaii	466	23.42	1,524	76.58			1,524	76.58	1,990	5,173	9.01	29.46		29.46	38.47					
Grand total	1,572,829	26.46	3,276,331	55.13	1,093,943	18.41	4,370,274	73.54	5,943,103	13,386,273	11.75	24.48	8.17	32.65	44.40					

1930 estimates.

The theory underlying the operation of the Clarke-McNary Act is that the Federal Government should furnish some 25 percent of the cooperative funds utilized. In terms of the amount which is estimated as necessary to give adequate protection, it is seen that in 1932 the Federal Government underwrote 47 percent of its maximum estimated obligation (one quarter of the total) and the States and private owners 44 percent of their three quarters.

An inspection of the record by regions, however, reveals striking inequalities. First, with reference to the performances of all agencies taken together, we find that in 1932 the Middle Atlantic group of States has already substantially exceeded its share of expenditures estimated as necessary, the percentage given being about 109. Next in order come the Lake States, whose actual expenditure is 88 percent of that needed. For the northern Rocky Mountain region the figure is 72. For New England it is 63, but there the fire season was very favorable, and something less than 100 percent would here have been expected in any event. The South and Central States each show the strikingly low figure of 16 percent. In the South it is to be noted from column 12 that the figure representing the Federal expenditures is 7 percent of the amount needed from all agencies, or, as shown in column 3, approximately 45 percent of the entire actual expenditures for the year. For the Central States there is a similar correspondence between the low percentage for all agencies (column 16) and the high percentage, approximately 42 percent, for the Federal share (column 3). This large sharing by the Federal Government follows from the Federal policy of guaranteeing a minimum allotment to any State which can qualify, the minimum being a certain percent (8 percent for 1933) of the estimated amount needed for adequate protection.

Reference has already been made to the difference between the 1930 estimate of annual cost for adequate protection (\$13,386,273), and the larger estimate arrived at in the section covering Protection Against Fire. The 1930 estimates were made for each State separately and in cooperation with the individual State forestry departments. They attempted to give the costs of organization and improvement programs necessary to afford adequate protection on the basis of existing conditions. The basic figures for this series of estimates are revised at approximately 5-year intervals, so as to take account of changing conditions and new information applicable to problems of the individual States. Figures for the larger estimate were arrived at by a careful adaptation of actual costs upon national forests and upon standards of protection set up for each major forest type. They were calculated by regions and not by States.

SHARING THE COST OF PROTECTION BETWEEN PRIVATE OWNERS AND THE PUBLIC

When the Clarke-McNary law was passed, the theory was held that the cost would ultimately be divided at least roughly as follows: Private owners, 50 percent; States, 25 percent; Federal Government 25 percent.

In table 3, columns 7, 5, and 3, we find that the actual percentages for 1932 over the country as a whole were: Private owners, 18.4 percent; States, 55.1 percent; and Federal Government, 26.5 percent. The position of the private owners and the States thus represents a

complete reversal and more, of the theoretical relationship. Furthermore, the tendency is to draw still further away from dependence on private money toward a more nearly complete dependence on public money. The proportionate sharing varies greatly in different regions. Fire protection in the New England, the Middle Atlantic, the Lake States and, to a less degree, the Central regions already is very nearly upon a basis of complete public support, the private expenditures of 1932 being 2.75, 0.21, 1.44, and 8.77 percent, respectively. The Pacific coast and the two Rocky Mountain regions, taken together, are approximately upon the theoretically accepted basis of 25 percent Federal, 25 percent State, and 50 percent private support, while the South approaches equal sharing by the Federal Government on the one hand and the State and private owners on the other.

In the northwestern section as a whole, fire protection was started in merchantable stands of timber, and the private owner took the initiative. Originally he could afford to pay the whole bill and was willing to do so. As he removes his merchantable values, however, his interest diminishes, and when the first major operation is completed he is often not disposed to hold and protect his cut-over areas. This later situation is at present acute only in one State, but it is anticipated in others. The difficulties are augmented by the fact that the cost of protecting cut-over land is much greater than for protecting mature stands, the ratio being sometimes as great as 10 to 1. In certain cases continuous yield or selective cutting management will cause the owner to retain his interest, but as a rule the assumption by the public of an increasing share of expense becomes definitely necessary as cutting proceeds. In the important Pacific coast and North Rocky Mountain regions the large sharing of costs by the private owners in 1932 does not, in itself, promise stability in protection. In certain parts of these regions the reverse is true for the reason explained. In the Northeast and in the Lake States the adjustments have already been made, and the public has assumed the bulk of the protection costs.

In the South we have almost the opposite condition to that in the Northwest. Protection interest here centers in second-growth timber and in reproduction. The short-rotation for turpentine, in particular has moved certain large owners to initiate protection with the help of the States and the Federal Government. The private interest and support seems likely to continue and to increase, although not to such a degree as to promise anything like State-wide protection. For State-wide results, the public funds, and especially State funds, will have to be greatly increased, and this may be a slow and laborious process. The cooperative plan has, however, succeeded admirably in the South in getting some degree of systematic protection started where there was none.

Figure 5 is a graphic summary, by regions, of the financial status of forest fire protection by the public and private agencies. The actual expenditures are shown in dark shading and the additional amounts needed to give adequate protection in light. In calculating the additional amounts, 25 percent of the total sum needed was taken as the ultimate Federal share and 75 percent as that of the States and private owners.

RECORD OF FOREST FIRES

Table 4 presents regional data from which an idea can be obtained as to the effectiveness of recent fire protection work. The figures are averages for the 5-year period 1926-30, and apply to protected areas only. Column 6 shows the proportion of area burned annually relative to the area protected; column 7, the proportion of allowable annual burn to area protected; column 8, the number of acres in the

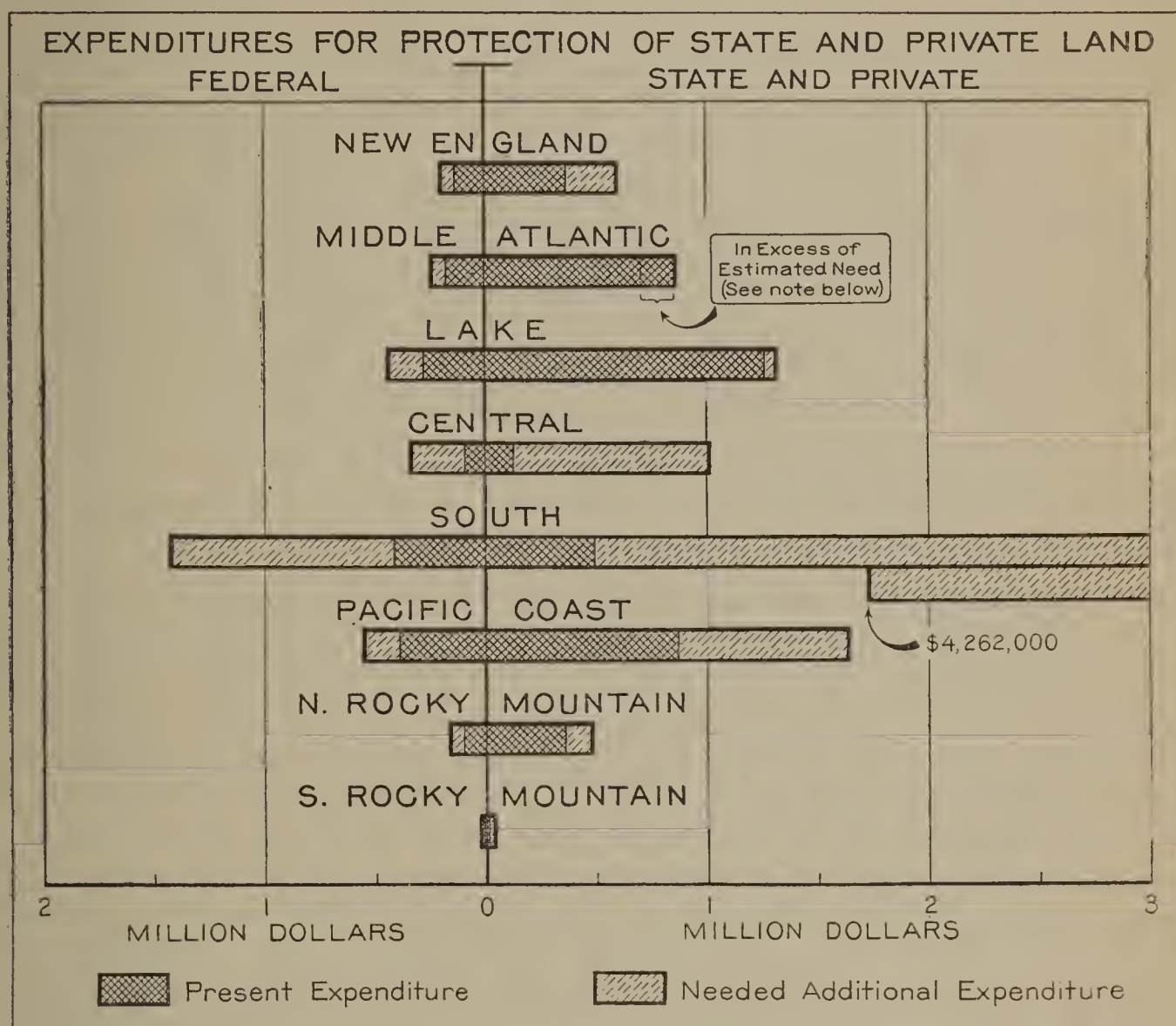


FIGURE 5.—Present expenditure (F.Y. 1932) for protecting State and private land from forest fire, in contrast with total expenditures needed (1930 estimates), show that the pressing need for increased appropriations is centered in the South and Central regions. Note: In the Middle Atlantic region the State and private owners spent more in F.Y. 1932 than the estimated requirement. Average expenditures for 5 years past would fall somewhat below this requirement.

average fire on protected land. The "allowable burn" is defined as the area that may burn over annually without impairing radically the forest values, if the predominant purposes of forest management in a given type are to be attained. This practical standard of fire control is more fully treated in the section entitled "Protection Against Fire." It must be noted that in tables 2, 3, and 5 of that section unprotected areas are included, while they are excluded from the present case.

TABLE 4.—Area burned on protected area, State and private land—Yearly average, 1926–30

Region	Number of fires per year	Area burned yearly					Size of average fire
		Produc- tive forest ¹	Nonpro- ductive forest ²	Total	Percentage of protected areas		
					Actual burn	Allow- able burn	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Per- cent</i>	<i>Per- cent</i>	<i>Acres</i>
New England.....	3, 643	74, 938	20, 936	95, 894	0. 31	0. 16	26. 3
Middle Atlantic.....	6, 590	270, 983	56, 822	327, 805	1. 08	. 35	49. 7
Lake States.....	4, 918	318, 664	238, 602	557, 266	1. 08	. 36	113. 3
Central.....	2, 868	272, 304	3, 098	275, 402	1. 80	. 59	96. 0
South.....	15, 893	1, 627, 215	68, 302	1, 695, 517	3. 30	1. 34	106. 7
Pacific coast.....	4, 964	456, 320	498, 785	955, 105	2. 41	. 49	192. 4
Northern Rocky Mountain.....	1, 166	91, 740	16, 982	108, 722	. 87	1. 05	93. 2
South Rocky Mountain.....	149	2, 134	2, 834	4, 968	. 11	. 41	33. 3
Total.....	40, 191	3, 114, 298	906, 361	4, 020, 659	1. 70	. 88	100. 0

¹ Includes mature merchantable timber and young timber.
² Includes protection areas whether forest or nonforest and areas of no watershed protection, or forest values.

From column 6 it will be noted that the New England, northern Rocky Mountain, and southern Rocky Mountain groups are the only ones showing less than 1 percent of area protected which is burned. Further, the north Rocky Mountain and the south Rocky Mountain groups are the only groups in which the percentage of actual area burned is less than the percentage of allowable burn as defined above. In New England it is indicated that fires covered about twice as great an area as should be allowed under adequate protection. These States spent, in 1932, 63 percent of the 1930 estimate of the adequate allowance. (See table 3, column 16.) In the Middle Atlantic States the area burned was about three times that allowable, while the 1932 expenditures were 109 percent of the estimated adequate amount. In the Lake States the area burned was again about three times that allowable, and the 1932 expenditures were 88 percent of the adequate estimate. In the Central States the area burned was about three times, in the South between two and three times, and in the Pacific coast region approximately five times the theoretically allowable burn. For the entire country the area burned over each year from 1926 to 1930 within protected areas was 1.70 percent of those areas, whereas the allowable burn was 0.88 percent. In other words, the area burned was almost exactly twice what it is calculated should be permitted to insure the production of full forest values on these lands.

AVERAGE SIZE OF FIRE

A study of the figures by years from which the averages of column 8 of table 4 are made up shows that, over the country as a whole, there was a decrease in the number of acres burned per fire, from 135.7 acres in 1926 to 86.8 in 1930. In the New England, Middle Atlantic, and South regions, this trend toward smaller area burned per fire is striking and evidences substantial progress. It is also to be noted in many individual States of the other regions. The effect of the relative

severity of the season upon the size of the average fire is, however, most compelling. It is so important, in fact, that a true index of protection efficiency must await a much longer statistical period than that now available.

NUMBER OF FIRES

The annual record for the years 1926-30 shows a steady increase in number of fires and, despite the decrease in acreage per fire, an increase in total area burned annually on the protected areas. While some of this increase naturally follows from the fact that the area protected was also increasing, it is significant to note that whereas the area protected increased 29 percent during the 5 years, the number of fires increased 124 percent and the area burned 43 percent.

The increase in number of fires is perhaps further explained by the fact that, with the better protection which certainly was provided in 1930, the record itself was more complete. This same phenomenon, however, is observed on the national forests and in States where a fairly uniform standard was maintained during the 5-year period. The real causes must be sought in a number of factors, some of which are climatic, as for example, decreased precipitation. In some sections a resistance on the part of local users of land to the development of young forest growth and "rough" has led to incendiarism. Very important, also, is the fact that people are traveling over the highways and using the woods in increasing numbers.

It is noteworthy that in one particularly bad fire section of New England where an intensive educational campaign in fire prevention was carried on over a 3-year period, the records show an increase and not a decrease in number of fires. Nevertheless, by intensive patrol and well organized suppression, the net result was a striking decrease in area burned as well as in the total protection costs. The local public was mobilized in this protection effort in a most thorough manner. The inference is clear that the gain was due to prompt detection of fire and aggressive attack, not to any real improvement in the matter of prevention of fire occurrence.

There is no doubt that forest-fire occurrence in the United States is rather generally on the increase, whatever may be the causes. This cannot be taken to mean that our protection efforts are decreasing in efficiency. We know that the reverse is true. It means that much greater effort is demanded if adequate control is to be obtained.

AREAS BURNED ON UNPROTECTED AREAS

The fire record for the more than 190 million acres classed as in need of protection and receiving none is exceedingly inaccurate. A great deal of work is done, however, to get rough estimates of forest or potential forest area burned within this "no man's land." Table 5 shows the yearly averages for the period 1926-30 of areas burned on unprotected areas, as nearly as the data allow, together with areas burned on protected areas, repeated for comparison. It will be noted at once that the great bulk of the total area of State and private land which is burned in all States (37 million out of 41 million) is within the unprotected area. The relative effectiveness of our protection effort, despite all drawbacks, is witnessed by the fact that whereas 1.7 percent of the protected area was burned, fires are reported to have covered 19.76 percent of the unprotected area in an average year of the period covered. These points are illustrated in figure 6.

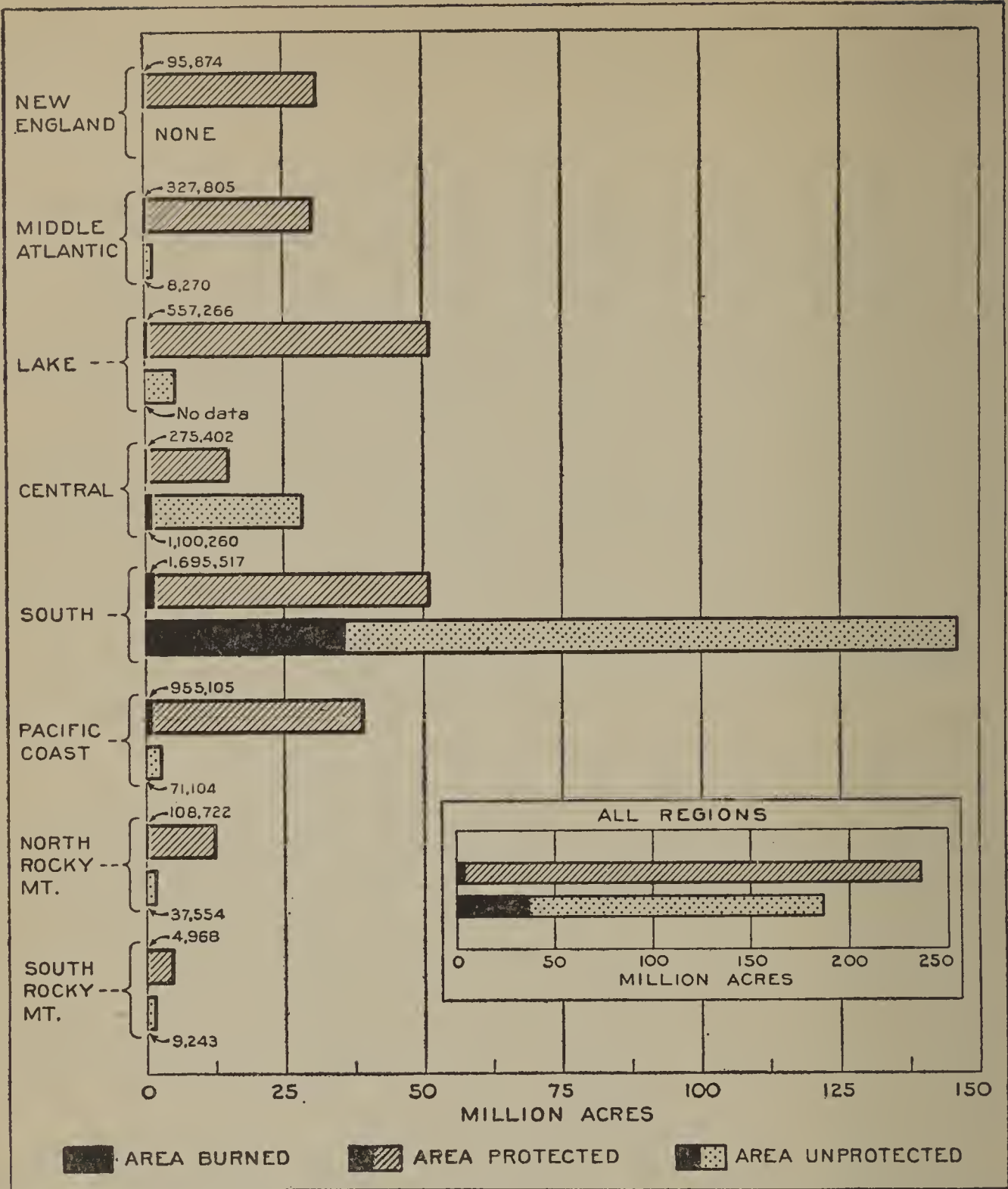


FIGURE 6.—Areas burned yearly on State and private lands protected and unprotected from fire, 1926-30.

TABLE 5.—Area burned on protected and unprotected areas—Yearly average, 1926-30

Region	Area burned			Percent protected	Percent unprotected	Percent total	Ratio to allowable burn ¹
	On protected lands	On unprotected lands	Total				
	Acres	Acres	Acres				Percent
New England	95,874		95,874	0.31		0.31	194
Middle Atlantic	327,805	8,270	336,075	1.08	.51	1.04	297
Lake States	557,266	(²)	557,266	1.08	(²)	(²)	(²)
Central	275,402	1,100,260	1,375,662	1.80	3.89	3.16	536
South	1,695,517	35,844,767	37,540,284	3.30	24.52	19.01	1,419
Pacific coast	955,105	71,104	1,026,209	2.41	2.58	2.43	496
North Rocky Mountain	108,722	37,554	146,276	.87	2.39	1.04	99
South Rocky Mountain	4,968	9,243	14,211	.11	.63	.23	56
Total	4,020,659	37,071,198	41,091,857	1.70	19.76	9.68	1,100

¹ Protected and unprotected.
² Certain areas in Wisconsin and Minnesota were reported as unprotected, but data as to fires on these areas are lacking.

Forest fires on unprotected areas are mainly a problem of the South and Central regions, and actually 97 percent of the unprotected areas burned were in the South. In two States of this region, a special effort has been made to determine acres burned in unprotected areas. In one of these States 20 percent of the unprotected area was estimated as having been burned over in 1931, as against $3\frac{1}{2}$ percent of the protected area. The corresponding figures for the other State were 14.6 percent and $3\frac{1}{2}$ percent. In a third State an 8 percent burn on protected units in 1931 is contrasted by the State forester with a 50 percent estimate of burn on areas that are unprotected. It must, of course, be borne in mind that fires do less relative damage in the pine woods of the South, where the bulk of unprotected area lies, than in many other regions.

The last column of table 5 indicates, for protected and unprotected areas together, the standard of fire control attained to date. From the total of this column it appears that, for the country as a whole, we are burning more than 11 times as many acres of State and private land as we should if standard forest growing conditions are to be maintained, the ratio of actual to allowable burn being 1,100 percent.

SIGNIFICANCE OF FEDERAL COOPERATION BY REGIONS

NEW ENGLAND

In the New England region, Federal funds have not been needed to initiate or insure State forest-fire protection activity. If these funds were discontinued, however, their complete replacement by the States might, according to the regional inspector, take as long as 10 years. In Maine, effective participation by the State in the protection of about 5 million acres of forest land outside a defined forestry district has been undertaken largely as the result of Federal cooperation.

There is no doubt that protection standards have been raised in the Northeast as elsewhere on account of Federal cooperation, although the States would have functioned fairly satisfactorily without Federal participation.

MIDDLE ATLANTIC

The situation in the Middle Atlantic region is similar to that in New England. A good standard of protection would be maintained in most of these States with or without Federal aid. Federal money of course contribute to the efficiency of the work, and during seasons of maximum difficulty it is of vital importance in sustaining the State's efforts. There has been mutual gain through contact with Forest Service personnel and, through this medium, with the work going forward in other States and regions and on the national forests. In one State, the initiation of State forestry activities was very directly contingent upon assistance by the Federal Government.

In another, Federal cooperation can be credited with the initial extension of protection and with current supervision of protection on an area of about 8 million acres of cut-over lands.

In other States of this region and throughout the country, Federal aid has undoubtedly contributed to the financial ability of States to

employ trained forestry personnel and to raise the standards of organization and service, which in turn has been directly reflected in more adequate protection of forest areas.

LAKE STATES

In the Lake States region a significant contribution of the Federal Government has been assistance in building effective organization and in coordination of the activities of adjoining States through the field work of the Federal inspectors. Outstanding fire divisions have been developed in each of the departments of conservation of Michigan, Wisconsin, and Minnesota, partly through Federal cooperation. Until recently the Federal funds, in themselves small in proportion to State funds, have perhaps been of less significance than the contribution to plans and policies, but in at least one of these States the Federal financial aid has resulted in substantially increased areas under systematic protection.

CENTRAL

The Central region includes Tennessee and Kentucky, which are generally classed as Southern States and to which may be applied the statements made for the South under the next heading. In the other Central States as a group, Federal aid has been a developing influence of large importance. In two States of this region cooperation has been discontinued pending the revision of State programs.

SOUTH

In the South the feature of Federal cooperation of perhaps greatest significance is its stimulating effect upon organization for the protection of forests from fire. All the States in this group have begun or strengthened their protection work under the stimulus of available Federal aid and with the help of Forest Service officers called into consultation by State legislatures and civic groups. In five of the States, the actual establishment of State forestry departments was quite directly due to the availability of Federal funds to help in carrying out forestry programs. In this region is found nearly half of the total State and private forest area in the country which is classed as needing public protection, more than 200 million acres, of which 150 million acres or more is still unprotected. It is a region where the forest is of great commercial importance and rapid growth and where its protection and development have, thus far, received inadequate public consideration.

It is important to recall that efforts toward organized protection of forest land in the South have been made only during the past few years. In only 5 of the 11 States in the South was this work undertaken as a State activity prior to 1925. Protection is here still in the pioneer stage. Those in a position to effect State action probably do not yet visualize the needs of forestry in true perspective in relation to such other public enterprises as schools and roads. The needs and the means of forest protection are now being actively presented, and support of the work is steadily gaining.

One of the greatest needs is the determination of forest and fire facts and their proper presentation. Experience has proved that

protection cannot be suddenly organized and made effective over large areas until the landowners themselves want their lands protected and are ready to pay for part of it either directly or out of funds raised by taxation. It can be successful only under enthusiastic local cooperation.

There is amply reason to be encouraged over results thus far accomplished, and the cooperative system embodied in the Clarke-McNary law is here particularly well adapted to the great variety of conditions encountered.

PACIFIC COAST

Federal cooperation in fire protection in the Pacific coast region has meant better protection than would have been practicable without it. It has meant increased funds from the States and from private owners. It has tended to sustain the interest of owners in their deforested land and to make the financing of far-reaching programs appear practicable. It has considerably advanced legislation and plans. To make these gains secure by some guarantee of continuity in the protection thus far attained is the purpose to which the Forest Service is bending its energies.

In California there has been a marked increase in State and county funds in recent years, as from \$73,000 in 1921 to \$505,000 in 1931. This was accompanied by an increase in Federal funds from \$23,000 to \$148,000. The State forestry department has been rapidly expanded and the work greatly increased. Federal cooperation has here been a strong stimulus and also has helped greatly through participation in plans and in making available the experience on the national forests. The financial help and moral support of the Federal Government has been effective in sustaining the State's efforts in protecting large areas which may later come into public ownership. Meanwhile, the public has a special stake in safeguarding its investment by the continuance of this work.

The region is characterized by a real need for an appreciation of Federal cooperation. Even though local financial support of the work is comparatively large, the part played by Federal cooperation is vital.

NORTH ROCKY MOUNTAIN

Federal cooperation in the north Rocky Mountain region had an important influence upon the passage of advanced pieces of forestry legislation, including provisions for compulsory participation in the protection of their forest properties and slash disposal by the private owners.

Federal cooperation has increased the numerical strength of the protective organizations and has improved performance, especially through close contact of associations and national forest officers. Improved practice has resulted from contact with activities on the national forests. The lumber industry has gained a better understanding of the aims and objects of forestry and has recognized the practicability of some of its phases to its own problem.

Federal aid has not prevented the breaking down of protection on about 150,000 acres in one instance in Idaho. The question naturally arises, Could the Federal cooperation have been so handled as to have prevented this? Possibly this cooperation came too late, or the funds

were insufficient. In 1932 the State contribution, 19 percent of the total, was entirely for the protection of State land. Federal expenditures constituted 19 percent of the total and applied in part to State land. The public thus shared less than 19 percent of the cost of protecting privately owned land in that State. The agricultural southern counties, with predominating legislative representation, would no doubt effectively check large undertakings by the State which would appear to benefit only timberland owners in the north. Even so, the State biennial appropriation increased from \$80,000, in 1924, the year previous to Clarke-McNary appropriations, to \$150,000 in 1932.

Although the problem for the future appears to be too great for the forest protective machinery thus far set up, it is true that protection has been greatly advanced by Federal cooperation in this region. The protection system here may in some cases be a temporary expedient, but even if so, it is a very important one.

It is to be hoped that the experience of many countries and of other States may not need to be suffered in this "Inland Empire" region—the cutting out and abandoning of the forest. Already the public is protecting its interest much more than did such regions as New England and the Lake States during the corresponding periods in their forest history. This is a hopeful sign. The picture of other States now spending millions to bring back the departed glories of the forest is no doubt exerting its influence upon the Northwest today. It is the writer's opinion that the northwestern regions will keep their cut-over lands under protection and that Federal cooperation will be an important factor in this accomplishment.

SOUTH ROCKY MOUNTAIN

In only three States of the South Rocky Mountain region has forest fire protective cooperation been undertaken, namely, in Nevada, New Mexico, and South Dakota. In New Mexico the private owners and the State contract the work to the Federal Government. Federal aid has resulted in a listing of State land with the Forest Service for protection and in the initiation of protection on some private lands and its retention on others. In Nevada a somewhat similar result has been secured. Without Federal cooperation here the protection effort of private owners would be of much less effect. In South Dakota, Federal cooperation has resulted in legislation enabling the State to protect 124,000 acres of forest land, mostly privately owned.

The area of forest land which is outside the national forests in other States of this region is not great enough to have given rise to cooperative State projects up to the present.

SUMMARY OF RESULTS IN FEDERAL AID IN FOREST FIRE PROTECTION

1. Federal cooperation has been an important factor in the establishment of 12 State forestry departments. In 17 States the protection of private forest land was commenced as a State activity as the direct result of Federal cooperation.

2. Under Federal cooperation the area of State and private forest land receiving organized protection increased from 95 million acres in 1915 to 228 million acres in 1931. Should this same rate of increase

be continued, the entire area needing protection would be covered in about 20 years. During the same period Federal, State, and private funds devoted to forest fire protection have increased from \$984,000 to \$7,222,000. Federal aid has been an important factor in this increase in area protected and in funds provided. The results are much more important than would be represented by the area which could be directly protected each year by a sum equivalent to the Federal aid appropriated. It should be noted that in the fiscal year 1932 the Federal Government financed 47 percent of its assumed obligation for an "adequate" program of protection, and the States and private owners 43 percent of theirs.

3. Forty-six per cent of the State and private forest land classed as in need of protection is still unprotected. This area lies for the most part in the South and Central regions, where Federal aid has meant the most in getting protection started.

4. On protected areas forest fires have annually burned over 1.7 per cent of the area protected, whereas fires have covered about 19.8 per cent of unprotected areas. This proves that the protection work undertaken has caused a sharp reduction in fire damage.

5. Forest fire protection in the New England, Middle Atlantic, Lake, north Rocky Mountain, south Rocky Mountain, and Pacific coast regions is well established. In many areas it can be expected to develop adequately under present plans, with increase in public support which can be anticipated. In parts of the north Rocky Mountain and Pacific coast regions, however, conditions are developing that may become critical as a result of the tendency toward abandonment of protection by owners interested primarily in the merchantable timber now on the land. The need here for a larger sharing in protection costs by the Federal Government and the States is clearly indicated. Fortunately, the area involved is comparatively small (less than 4 per cent of forest area of the country), although the present importance of the timber is very great.

In the South lies the great unprotected forest area, and to apply the proper degree of protection involves difficult problems which have important social as well as economic and financial aspects. Progress will, it is believed, be necessarily slow. The private owner here has an increasing interest, since the forest land principally involved is coming up to stands of rapid-growth timber which are being commercially utilized at a young age. This interest cannot, however, be relied upon to bring State-wide protection without increased public participation.

6. In the administration of Federal aid the Forest Service has served as a clearing house for information and for educational material to the advantage of the State projects. The merit system in the employment of men has been promoted, technical standards among personnel have been raised, and methods of protection have been measurably improved.

7. The questions may be asked, Has Federal aid in fire protection stimulated the practice of forestry on private land? To what extent is such Federal aid effective in keeping lands in private ownership?

In most cases where the question is up for decision whether an owner shall retain title to a piece of forest land or let it go tax delinquent, the answer is based upon many considerations other than protection. Insofar as the protection consideration has force, Federal

aid has had a stabilizing influence through the increased forest values which have resulted. Federal aid has promoted protection, but the whole of protection is only one element, though a very necessary element, in the development of the forests for use under private ownership.

During the transition period between that in which the main supply of timber comes from old growth and that in which it will come from regrown timber on lands previously cut over, the practice of forestry by the private owner will, it is believed, slowly but steadily increase. There may be many set-backs. The final classification of lands which should be devoted to forest uses has not yet been made. But fire protection remains the necessary condition in the absence of which the practicability of forestry can hardly be intelligently determined. Moreover, fire protection is of distinct social and economic advantage, whether or not it is now leading owners to planned and intensive forest management.

In the case of second-growth stands as contrasted with old-growth stands, the significance of protection, even in the absence of conscious silvicultural management, is relatively great, and it is with the protection of second-growth stands that the public is principally concerned. When second growth comes into yield, the operator seldom makes a clean sweep of the stand. As compared with logging in the virgin forest, operations are on a smaller scale, leaving more chance for natural restocking. Cutting a smaller proportion of the trees frequently presents to the owner the natural means of securing quick returns. Self-interest of such an owner leads him into some form of selective logging, and the result is less devastation over large areas. This means that second-growth stands can be made continuously productive under protection alone to a much greater extent than may be generally supposed.

FEDERAL AID IN FARM FOREST PLANTING

Prior to 1925 there was an active demand for forest planting stock in many States in excess of the supply. Only 18 States were distributing trees for forest planting. Farmers own about 127 million acres of forest land, much of which can be greatly improved by planting. They own much land which has been abandoned for agricultural crops, but which can be profitably utilized if planted to trees. Such a venture is possible to the farmer only if he can secure the right trees of the right size, in quantity, at low cost. He could not find such opportunities in the open market.

Section 4 of the Clarke-McNary Act provided for the first time for Federal cooperation with the States in the production and distribution of trees for farm planting. In the words of the law, the Secretary of Agriculture is authorized and directed

To cooperate with the various States in the procurement, production, and distribution of forest-tree seeds and plants, for the purpose of establishing wind-breaks, shelter belts, and farm woodlots upon denuded or nonforested lands within such cooperating States, under such conditions and requirements as he may prescribe to the end that forest-tree seeds or plants so procured, produced, or distributed shall be used effectively for planting denuded or nonforested lands in the cooperating States and growing timber thereon: * * *.

This section includes the usual limitation of Federal expenditures to amounts not exceeding those expended by the State for the same

purpose. The authorization of the amount to be appropriated annually is limited to not more than \$100,000.

This provision became effective through the appropriation of \$50,000 by the Federal Government on July 1, 1925. For the fiscal year 1932, the appropriation was \$95,000, while that for 1933 is \$79,960. For the 7-year period 1926–32 the Federal expenditures have totalled \$530,487. Table 6 shows the distribution of expenditures as between the States and the Federal Government during that period.

ADMINISTRATION

The projects are managed by the States, just as in the administration of cooperative forest fire protection, and the Federal inspector participates in State plans and budgets. He inspects the work to determine the effectiveness with which moneys are spent. Upon his certification the States are reimbursed by the Federal Government to the extent of its obligation after the initial payments are made by the State.

RESULTS

In 1926, in direct response to the stimulus of Federal aid, the number of States raising and distributing trees for planting increased from 18 to 30. Forty States, including Puerto Rico and Hawaii, are engaged in this activity during the present fiscal year (1933), 18 of which owe their start in the work to the provision of Federal assistance.

During the 6 calendar years 1926–31, under the Federal cooperative projects, a total of 156 million trees were distributed to farmers by the States. From this it would appear that something more than 150,000 acres of farm woodlands and shelter belts were newly established. Many of the plantings have served as demonstrations to guide neighboring farmers. During the same period the cooperating States reported the distribution, without aid from the Federal Government, of 113 million trees to private landowners other than farmers and the planting of 150 million trees on State forests.

TABLE 6.—*Expenditures in aid of farm forest planting*

Year	Federal	State	Total
1926.....	\$45, 006	\$223, 272	\$268, 278
1927.....	71, 195	241, 738	312, 933
1928.....	74, 977	301, 664	376, 641
1929.....	74, 372	295, 245	369, 617
1930.....	80, 479	322, 035	402, 514
1931.....	90, 798	248, 091	338, 889
1932.....	93, 660	204, 438	298, 098
Total.....	530, 487	1, 836, 483	2, 366, 970

Only a small increase has occurred from year to year in farm planting over the country as a whole. Starting in the calendar year 1926 with about 23 million trees planted, the number increased to 29 million in 1928, but during the next 3 years it dropped to an average of about 25½ million.

Generally speaking, the projects have not developed into quantity production on a large scale but have held to an average distribution of less than a million trees for farmers per year per State, their effect

being primarily educational and demonstrational. Considerably more trees would probably have been distributed during the past 2 years except for the depression. The general course of farm planting is indicated in table 7.

This table shows substantial increases in all regions except in the New England and the Middle Atlantic regions. The sharp declines in these regions were sufficient to cause a net decline for the country as a whole since 1928. It should be noted, however, that both these regions have substantially increased distribution to private landowners other than farmers and planting on their State forests, so that their grand total, including distribution outside the Clarke-McNary law cooperation, shows an increase—New England from 7 million in 1926 to 8¾ million in 1930, and the Middle Atlantic region from 32 to 36 million. The distribution of trees which the cooperating States made in 1930 for all uses is shown, by regions, in table 8.

TABLE 7.—*Number of trees distributed to farmers*

Region	Year		
	1926	1928	1930
New England.....	2, 790, 000	3, 003, 000	2, 262, 000
Middle Atlantic.....	17, 385, 000	19, 897, 000	13, 481, 000
Lake.....	580, 000	1, 335, 000	2, 029, 000
Central.....	1, 206, 000	2, 779, 000	3, 540, 000
South.....	119, 000	549, 000	1, 874, 000
Pacific coast.....	5, 000	126, 000	263, 000
North Rocky Mountain.....	83, 000	227, 000	433, 000
South Rocky Mountain.....	71, 000	202, 000	239, 000
Hawaii and Puerto Rico.....	371, 000	639, 000	1, 715, 000
Total.....	22, 610, 000	28, 757, 000	25, 836, 000

REGIONAL ASPECTS OF FEDERAL COOPERATION IN FARM PLANTING

In New England forest tree nursery practice was already developed by most of the States prior to the time of Federal participation. Federal cooperation has, however, resulted in some reduction in the price which the farmer has had to pay for the trees and has led to more effective inspection of plantations to check up on and to insure success in planting. It has also led to more thorough accounting by the States for all planting activity.

In the Middle Atlantic region we find much the same situation as in New England. Most of the States were active in planting before Federal participation, but one or possibly two of the States would not have initiated tree production and distribution without Federal help.

In the South, forest nurseries would probably not have been attempted by at least six of the States without Federal cooperation. Here advice and assistance other than financial in establishing the nurseries has also been of distinct advantage. From the point of view of education and demonstration, the State forestry departments are making good use of tree poduction and distribution as one of the important means of furthering the practice of forestry.

TABLE 8.—*Distribution of forest planting stock, by regions, for the calendar year 1930*

Region	Number of trees distributed			
	To farm lands (Clarke-McNary projects)	To State lands	To privately owned lands other than farms	Total
New England.....	2, 261, 601	3, 127, 500	3, 323, 786	8, 712, 887
Middle Atlantic.....	13, 480, 735	8, 683, 550	14, 273, 750	36, 438, 035
Lake States.....	2, 028, 709	17, 558, 500	2, 369, 150	21, 956, 359
Central.....	3, 540, 455	588, 375	966, 850	5, 095, 680
South.....	1, 873, 980	75, 429	1, 502, 924	3, 452, 333
Pacific coast.....	262, 631			262, 631
North Rocky Mountain.....	433, 400		15, 900	449, 300
South Rocky Mountain.....	239, 304	12, 900	11, 500	263, 704
Hawaii.....	158, 400	365, 700	390, 700	914, 800
Puerto Rico.....	1, 557, 000	31, 700	185, 200	1, 773, 900
Total.....	25, 836, 215	30, 443, 654	23, 039, 760	79, 319, 629

In States or parts of States where tree growth is largely absent, typified by parts of Montana, Wyoming, Colorado, the Dakotas, and Nebraska, farm planting is mostly in the form of windbreaks and shelter belts. A block of trees set so as to protect farm buildings and stock or cultivated fields and orchards is here of high importance. Federal cooperation has been definitely helpful in establishing such plantations. In 1931 in the States of Montana, Idaho, North Dakota, Iowa, Nebraska, Colorado, Wyoming, and Utah, approximately 3,000 farmers established such plantations. Their value to farm homes and as demonstrations is inestimable. The work would probably not have been undertaken in at least five of these States without the impetus of Federal aid.

In other States, as in Tennessee and Mississippi, the planting of gullied portions of farms is returning otherwise waste areas to profitable use.

DIFFICULTIES ARISING FROM FARM LIMITATION

Three fourths of the State nurseries are raising stock for reforestation of other land than farm land. Under the law, however, the Federal Government can cooperate with these States only in that part of their work which involves the production and distribution of trees to farmers. The line is difficult to draw, and the distinction seems illogical. The point of view of the State foresters is that the needs of the land rather than the classification of the owner is of first importance, although the large owner who may need no public help would not generally be served until small applicants had been satisfied. An amendment to change the conditions of Federal cooperation in this respect has several times been presented to Congress.

CONCLUSIONS

Federal aid in farm forest planting has been directly responsible for the initiation of such work as a State activity in at least 18 States; this is its greatest achievement. It supplied to each State a small

sum, about \$2,000, with which the State was enabled to find \$2,000 additional to start the work.

The effect of the Federal contribution has been to reduce the price of trees which the farmer has to pay. It appears to be desirable to sell the trees rather than to give them away. They are more highly valued and better planted when obtained only for a price. This price is low. In theory it is less than cost by at least the amount of the Federal appropriation, because, under the Federal regulations made in the administration of the project, the State is not permitted to recover through sale an amount in excess of what the State itself puts into the work. In most States the recovery is much less than that.

Federal cooperation has tended to improve State practice. In lieu of money it has supplied Norway pine seed when hard to get from other sources. It has exerted influence upon the States to avoid use of planting stock for landscape and related private uses in competition with commercial nursery stock.

Experience has proved that satisfactory production and distribution of suitable trees for forest planting has not been attained in the absence of public assistance and guidance. The commercial production of forest stock is still undeveloped in most sections of the country. The State forestry departments are showing the way by producing these small trees in quantity and at minimum cost. When the market is sufficiently developed, it is possible that commercial nurseries may find it profitable to engage in production of forest trees of suitable species and size and at such prices as would make forest planting feasible, as some of them are already doing to a small extent. The interest in trees which has been stimulated by public activity in forest planting has, it is confidently believed, increased the business of nurserymen in other lines, such as fruit, nut, and decorative tree stock. The farmer cannot afford to plant his waste lands unless the planting stock can be bought at a low figure, a figure much lower than that contemplated by nurserymen before the practice of raising small trees for forest planting was established, by State and Federal agencies. The purpose of the law is to enable him to get the kind and quantity of forest trees needed for his special uses at a cost which he can afford.

It has been estimated that there will remain in the United States a total of approximately 70 million acres of land now in a poor stage of restocking, deforested, and submarginal agriculturally, which will not become satisfactorily restocked within the next 40 years without planting. How much it may be economically advisable to plant will be determined on the basis of our forest needs. But, in any event, this estimate makes it clear that the 1930 program of planting on State and private land, as indicated by table 8, which would take care of less than 100,000 acres, is quite inadequate. The present effort in this line can be considered as essentially educational and demonstrational, and even under that aspect it should be much extended.

COOPERATION WITH STATES IN FARM FORESTRY EXTENSION

Federal cooperation with the States in farm forestry extension was first undertaken on a Nation-wide basis as a result of the Clarke-McNary law, beginning with the fiscal year 1926. Section 5 of that act authorizes and directs the Secretary of Agriculture, "in cooperation with appropriate officials of the various States, or, in his discretion, with other suitable agencies, to assist the owners of farms in establishing, improving, and renewing woodlots, shelter belts, wind-breaks, and other valuable forest growth, and in growing and renewing useful timber crops." The usual limitation is provided, namely, that the amount expended by the Federal Government under the section shall not exceed the amount expended by the State, and the amount authorized to be appropriated annually is \$100,000.

Farm forestry extension ¹ is conducted as a part of the program of the various State colleges of agriculture. Federal cooperation in the work is administered by the Extension Service of the Department of Agriculture, with the cooperation of the Forest Service.

¹ The statement from this point to the topic Federal aid to States for roads is contributed by W. K. Williams, forestry specialist of the Office of Cooperative Extension Work, Department of Agriculture, in this activity.

TABLE 9.—Expenditures for farm forestry extension work in States and Territories, 1915 to 1933, inclusive

Year	Total	Total Federal	Total within States	Federal funds				Funds within States		
				Smith-Lever	Capper-Ketcham	Clarke-McNary	Additional cooperative	State and college	County	Other
1915	\$3,965.44		\$3,965.44					\$3,965.44		
1916	3,638.84	\$358.45	3,280.39					3,280.39		
1917	9,558.50	4,591.58	4,966.92	4,591.58				4,966.92		
1918	5,099.82	1,201.41	3,898.41	1,201.41				3,898.41		
1919	9,499.45	2,089.12	7,410.33	2,089.12				7,410.33		
1920	10,694.57	2,248.18	8,446.39	2,248.18				8,446.39		
1921	10,936.54	1,183.59	9,752.95	1,183.59				9,752.95		
1922	13,201.60	409.84	12,791.76	409.84				12,791.76		
1923	14,187.56	4,526.43	9,661.13	4,526.43				9,661.13		
1924	18,928.99	9,184.80	9,744.19	9,184.80				9,744.19		
1925	30,918.78	7,053.51	23,865.27	7,053.51				23,865.27		
1926	82,537.27	33,250.37	49,286.90	1,230.03				49,286.90		
1927	115,836.77	47,724.26	68,112.51	4,472.60		\$32,020.34		67,795.84	\$316.67	
1928	127,658.44	54,468.65	73,189.79	3,804.14		50,664.51		71,036.27	800.00	\$1,353.52
1929	132,198.86	57,565.06	74,633.80	4,826.69	\$1,050	51,688.37		74,357.35	249.11	27.34
1930	145,660.00	59,817.73	85,842.27	4,599.52		55,218.21		85,842.27		
1931	161,208.63	66,612.59	94,596.04	6,570.63		59,552.05	\$489.91	94,570.45		25.59
1932 ¹	159,963.00	69,934.00	90,029.00	8,584.00		61,350.00		90,029.00		
1933 ¹	151,226.48	72,005.68	79,220.80	9,695.68		62,310.00		79,041.80	179.00	
Total	1,206,919.54	494,225.25	712,694.29	76,630.20	1,050	416,055.14	489.91	709,743.06	1,544.78	1,406.45

¹ Estimated.

FEDERAL FUNDS

Most of the Federal funds used in farm forestry extension are made available under section 5 of the Clarke-McNary law. A smaller amount comes through the Smith-Lever law. Table 9 shows all the Federal funds used and the expenditures, by years since 1915. The principal Federal fund (Clarke-McNary) is supplemented by an equal amount of State money. In total amount for the entire period shown in table 9, the State funds used considerably exceed the amount of Federal moneys expended. Most of the Federal appropriation is used in payment of part of the salaries of State extension foresters, who are the leaders in the extension programs in farm forestry in the 33 States

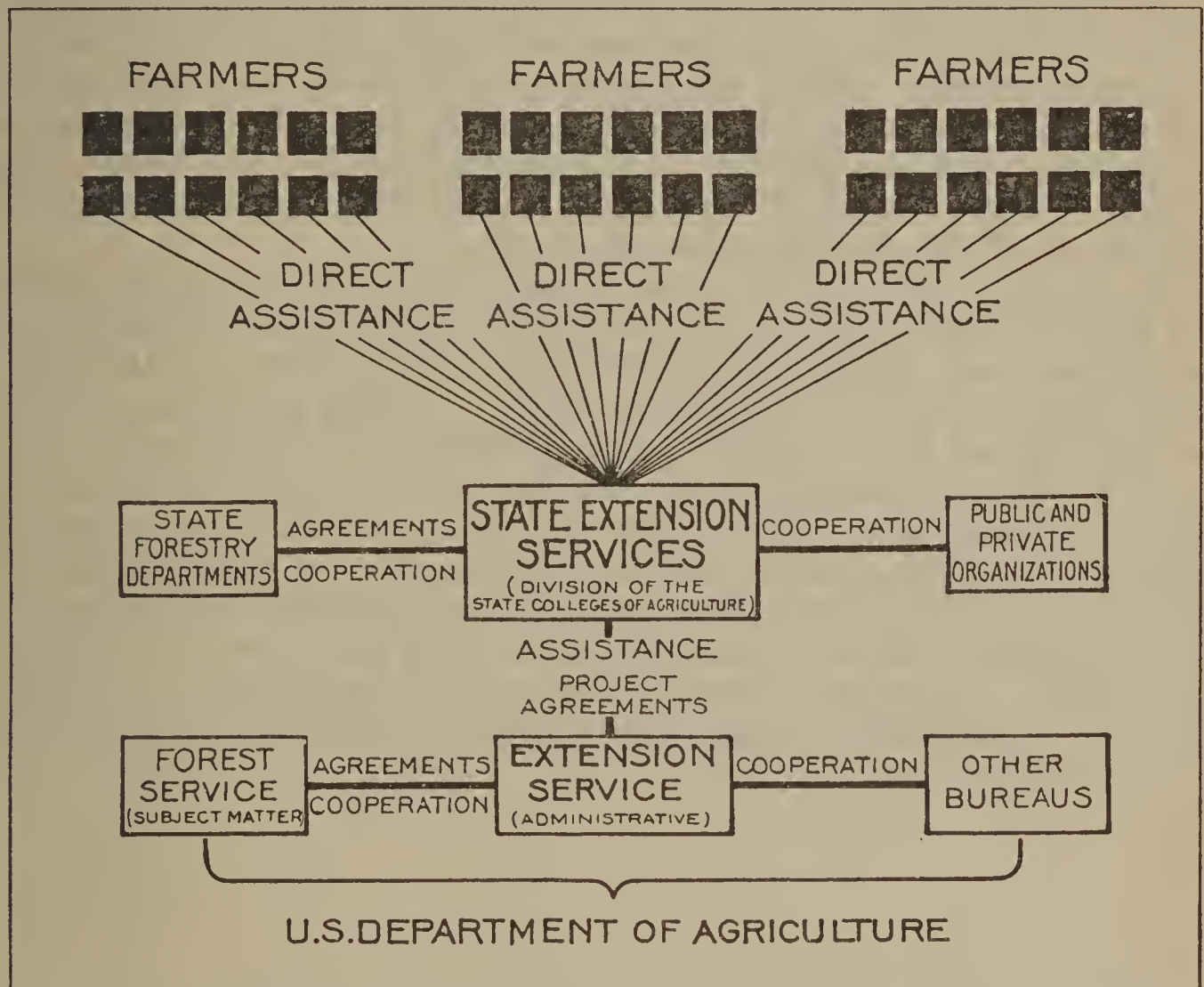


FIGURE 7.—Administration of farm forestry extension under sec. 5, Clarke-McNary Law.

and 2 Territories now cooperating under section 5 of the Clarke-McNary law, the Smith-Lever law, or both.

ADMINISTRATION

In administering farm forestry the Federal Extension Service has the cooperation of the Forest Service in professional matters and, through the Forest Service, an indirect contact with the State forestry departments. The latter work with the State extension services in promoting programs and in giving direct assistance to farmers. In figure 7 is seen the administrative and cooperative organization set up for the work. In the main, the administration and extension of forestry in the States is conducted by the State extension services in much the same manner as livestock extension, horticultural extension, or any other phase of agriculture. The system makes available a

total force of 4,444 local field workers (as of June 30, 1931), including county agricultural agents, home demonstration agents, and 4-H club leaders. Not all of this group in the States has carried on forestry work; the number, however, is increasing yearly. During 1931, 878 county agents participated in forestry activities in 46 States, 31 home agents in 7 States, and 95 4-H club agents in 16 States—a total of 1,004 extension agents.

RESULTS

To assist in the profitable management of farm woodlands and reforestation of unused farm lands constitutes the task undertaken by the State extension services in cooperating with the Federal extension service. Since July 1, 1925, when farm forestry funds under section 5 of the Clarke-McNary law became available, definite progress has been made yearly. Table 10 presents statistics of accomplishment. It shows that the total number of farms that had adopted improved practices in 1926 was 10,074. In 1929 the number had more than doubled. The same trend of progress is indicated in practically every other phase of the extension forestry work.

The planting of forest trees on farms continues to be one of the most popular phases of extension forestry. Approximately 26 million forest trees were distributed to farmers during 1930 by the State forest nurseries and 25½ million in 1931. A large percentage of the trees distributed were planted under the direction of the State extension foresters and county agents. In the prairie and plains States the planting of trees for wind-breaks and shelter belts is meeting the problem of providing protection for farmsteads. In the Eastern and Southern States planting is done mainly for the control of erosion and the production of timber products such as fence posts, poles, pulpwood and sawlogs. Planting of forest trees on idle farm lands not needed for agricultural purposes is gaining increased attention in those States having marginal land problems.

TABLE 10.—Statistical results of work in forestry as reported by all extension agents from 1923 to 1931 inclusive

Item	1923	1924	1925	1926	1927	1928	1929	1930	1931
Method demonstrations held.....	-----	-----	-----	-----	2,849	3,168	3,854	3,881	3,959
Adult result demonstrations completed.....	1,422	1,336	1,514	2,309	3,358	4,510	4,870	5,748	6,594
Acres in completed demonstrations ¹	69,817	1,719	1,917	2,286	133,693	241,875	240,959	-----	-----
Boys enrolled.....	175	71,436	162,608	110,866	2,867	3,539	4,796	6,826	7,611
Girls enrolled.....	79	401	523	1,263	2,296	3,492	4,812	2,068	3,009
Boys completing.....	37	8	45	214	1,980	2,333	3,325	4,248	5,634
Girls completing.....	6	213	291	617	212	386	527	1,131	2,243
Transplant beds cared for by club members.....	-----	5	17	113	-----	-----	-----	448	3,277
Acres farm wood lot managed by club members.....	51	-----	564	689	3,449	5,585	116,711	11,297	1,735
Farms influenced by adult or junior extension work.....	4,635	121	-----	-----	-----	-----	-----	-----	-----
Acres involved in preceding question.....	101,622	-----	-----	-----	-----	-----	-----	-----	-----
Acres forest or farm woodland planted.....	1,878	1,493	2,317	3,872	6,082	6,638	5,334	5,469	7,057
Acres involved in preceding question.....	5,851	132,763	11,458	23,422	19,455	16,471	25,932	16,222	79,913
Farms assisted in forest or wood lot management.....	965	1,071	2,126	3,412	4,509	5,476	6,013	6,170	9,534
Acres involved in preceding question.....	17,980	31,738	35,135	111,668	222,135	307,224	241,459	387,829	615,932
Farms planting windbreaks.....	904	817	1,191	1,679	1,924	3,715	3,088	3,872	4,676
Farms following recommendations as to control of blister rust.....	-----	437	485	585	1,592	1,259	949	968	1,932
Acres involved in preceding question ¹	-----	137,290	140,586	31,179	249,808	153,233	65,226	-----	-----
Farms assisted in other ways relative to forestry.....	-----	-----	-----	-----	-----	-----	-----	9,119	11,104
Farms adopting improved practices relative to forestry ¹	-----	5,628	6,574	10,074	15,807	18,902	21,350	-----	-----

¹ Questions discontinued 1930.

In the timbered States east of the Prairies, such management projects as improvement cutting of woodlands, fire protection, and the marketing of timber products have been stressed as features of the State woodland management programs. It will be noted in table 10 that 9,534 farmers were assisted in this work in 1931. The work of these men, considered as demonstrators, has its effect in spreading better farm forestry practices in the respective communities. Other phases commanding local attention in some States have been instruction in sawmill practice, estimating timber, the marketing of Christmas trees, pulpwood, and black walnuts, care of maple sugar orchards, and grading of maple sirup.

In addition to the projects under way with farmers, the State extension foresters are finding an increasing interest in forestry manifested among farm boys and girls in 4-H clubs. Many of these club members are engaged in such projects as establishing forest tree plantations, estimating timber, protecting the farm woods from fire, planting black walnut, establishing school forests, and marketing timber products. Table 10 shows that 10,620 4-H club members enrolled for forestry work in 1931, a larger number than ever before, and that 7,877 completed their projects during the year.

METHODS OF EXTENDING FORESTRY

One method of encouraging better woodland practices has been through the use of State forestry publications. In many States printed bulletins and circulars have been prepared. These publications have been supplemented with an increasing amount of mimeograph material, folders, handbills, envelope inserts, and leaflets, besides bulletins furnished by the United States Forest Service. Circular letters have come into wide use in connection with campaigns and other special efforts to influence the spread of improved practice. Other educational devices largely employed to further forestry teaching among farmers are woods demonstrations, exhibits, meetings, tours, news stories, monthly news letters, and radio.

COOPERATION

For the success of farm forestry extension the whole-hearted cooperation of all agencies in the forestry and agricultural fields is necessary. The cooperation of State forestry departments, particularly, is essential to the proper development of the program. In most cases there are working agreements between the State extension services and the forestry departments, and their cooperation has been of mutual benefit. The cooperation accorded by State forestry departments includes assistance in financing the project, technical advice, publication of forestry bulletins, and growing and distribution of forest-tree seedlings for farm planting.

The active cooperation of many other agencies has contributed to the success of the extension forestry work. Among them should be mentioned the farm bureaus, county and community organizations, lumber companies, State and Federal experiment stations, State departments of game and fishery, State departments of education, civic clubs, conservation organizations, women's clubs, railroad companies, and the press.

FEDERAL AID TO STATES FOR ROADS

Until the period immediately preceding the present century, the counties and towns or similar units of government had entire jurisdiction over the construction and maintenance of highways. Prior to 1900, however, the States began to aid the local units in establishing highways of State-wide significance.

With the advent of the automobile, the need for Nation-wide systems of roads began to be keenly felt, and on July 11, 1916, by the Federal Aid Road Act of that date, the Federal Government entered upon the now well-known Bankhead plan of taking the lead in modern highway development, under which a total of \$1,005,381,470 of Federal money has been spent up to June 30, 1932. This has been applied to the construction and maintenance of 101,389 miles of roads and bridges, the total cost of which has been \$2,296,431,593. The distribution by regions is shown in table 11.

The effect of road extension and improvement upon the protection and utilization of the forests has been great. Better roads have brought the products of the forest nearer to market and thus increased stumpage values in localities that were formerly inaccessible. They have greatly facilitated the attack upon forest fires and thus reduced protection costs. Roads have, however, exerted an adverse influence of grave import in some localities through greatly increased fire occurrence due to the carelessness of the traveling public.

TABLE 11.—Cost and mileage of Federal-aid roads
[Totals as of June 30, 1932]

Region	Total cost	Federal-aid funds	Miles
New England.....	\$113, 269, 101. 01	\$43, 180, 751. 72	2, 720. 5
Middle Atlantic.....	357, 883, 875. 18	124, 619, 645. 46	7, 848. 7
Lake States.....	242, 373, 481. 43	104, 659, 405. 42	14, 143. 8
Central.....	640, 321, 834. 99	278, 710, 829. 45	25, 802. 5
South.....	564, 338, 595. 51	250, 859, 581. 72	27, 718. 3
Pacific coast.....	143, 508, 631. 00	66, 439, 273. 05	5, 029. 1
North Rocky Mountain.....	55, 460, 702. 52	31, 788, 024. 70	4, 215. 8
South Rocky Mountain.....	175, 335, 515. 81	103, 833, 541. 14	13, 834. 1
Hawaii.....	3, 939, 855. 79	1, 290, 417. 84	76. 3
Total.....	2, 296, 431, 593. 24	1, 005, 381, 470. 50	101, 389. 1

The highway program would go forward without reference to the forests and does not need extended treatment here. The Federal Aid Road Act represents, however, by far the greatest extension of Federal aid to the States and is of importance in any discussion of such activities. The more than 1 billion dollars spent thus far by the Federal Government in aid of roads contrasts strikingly with the less than 12 million dollars spent in aid of forestry under the Weeks and Clarke-McNary Acts. The latter sum is only a little more than 1 percent of the former. This ratio may roughly indicate the relative appreciation of needs on the part of the public. By no leap of the imagination does it express the actual relative need which the public has for these two forms of service.

FEDERAL LAND GRANTS TO STATES

Congress has, since 1785, granted land from its public domain to every State in the Union. In cases where States had no public land within their borders, they received scrip for land in other States which the States turned into cash. The area of land so granted reached, at the end of the fiscal year 1931, the enormous aggregate of 203 million acres. In addition, the railroads have been granted approximately 94 million acres representing public interest in the extension of transportation facilities.

The purpose underlying the Land Grant Act of 1785 was to help the States to support their public schools. The furtherance of education has been a dominant motive in the granting of millions of acres of land to the States throughout the Nation's history. Other purposes have, of course, been served. Early in the nineteenth century Congress donated nearly 5 million acres of public domain to aid States in building canals. In 1841, nineteen States received half a million acres each for "internal improvements". The great period of railroad grants came mainly after the Civil War.

The condition upon which States received their grants during the first 75 years was very simple, namely, that moneys received from sales would be devoted to public schools, highways, or to whatever purpose was designated. Some of this land brought the State \$3 per acre which a year later was sold for \$25 per acre. Other areas were sold by the States for as little as 50 or 60 cents per acre.

It is interesting to note that New York sold its scrip to Ezra Cornell at 60 cents per acre, with the understanding that he should pay for the land as he sold it, and that all receipts over the amount of his obligation would become an endowment for a university. Cornell located the scrip in the white-pine district of Wisconsin and sold most of it at an average price of \$6.73 per acre, thus securing for Cornell University an endowment of more than 5½ million dollars. The university's forestry department has, of course, benefited along with other units. Forest land of high value was here involved which could presumably have been managed for continuous revenue. The fact that the forest property was exploited without reference to its continuing timber values represents a highly successful piece of business for New York, the State which the grant was intended to benefit, but it also illustrates strikingly the fact that neither the Federal Government nor the States remotely contemplated that the forest-covered parts of the vast areas granted would be managed as State forests.

During the last 50 years, Congress has imposed more rigid requirements. Certain lands were granted to States on condition that they should be irrigated and prepared for settlement. Title to these lands was to pass only after completion of the designated program. In 1927, 10 States had applied under that provision for lands totaling nearly 8½ million acres, but titles to only a little more than 1 million acres, were approved. In the case of grants to Arizona and New Mexico in 1910, the Governor and the secretary of state were required to approve all investments of funds derived from the "sale of lands, and disposal or sale for any objects other than specified in the law was to be deemed a breach of trust." The areas granted as land or scrip to the several States from 1785 to 1931 are shown in table 12. In this

table an attempt is also made to show the amount of forest land which the States still retain of all the Federal lands granted to them. The policies and programs of States in handling the grants are briefly discussed below.

TABLE 12.—*Land and scrip granted to States and Territories for educational and other purposes, 1785 to 1931*

Region	Total Federal land grants	Forest areas now held by States from grants	Region	Total Federal land grants	Forest areas now held by States from grants
New England:	<i>Acres</i>	<i>Acres</i>	South:	<i>Acres</i>	<i>Acres</i>
Connecticut.....scrip..	180,000	-----	Alabama.....	2,258,000	¹ 270,000
Maine.....do.....	210,000	-----	Arkansas.....	9,373,000	(²)
Massachusetts.....do.....	360,000	-----	Florida.....	21,970,000	(²)
New Hampshire.....do.....	150,000	-----	Georgia.....scrip..	270,000	-----
Rhode Island.....do.....	120,000	-----	Louisiana.....	11,030,000	25,000
Vermont.....do.....	150,000	-----	Mississippi.....	5,021,000	300,000
Total.....	1,170,000	-----	North Carolina.....scrip..	270,000	-----
Middle Atlantic:			Oklahoma.....	3,096,000	(²)
Delaware.....scrip..	90,000	-----	South Carolina.....scrip..	180,000	-----
Maryland.....do.....	210,000	-----	Texas.....do.....	180,000	-----
New Jersey.....do.....	210,000	-----	Virginia.....do.....	300,000	-----
New York.....do.....	990,000	-----	Total.....	53,948,000	595,000
Pennsylvania.....do.....	780,000	-----	Pacific coast:		
Total.....	2,280,000	-----	California.....	8,426,000	14,463
Lake States:			Oregon.....	4,353,000	³ 33,000
Michigan.....	8,788,000	⁵ 62,000	Washington.....	3,044,000	⁵ 1,248,000
Minnesota.....	8,372,000	1,230,000	Total.....	15,823,000	1,295,463
North Dakota.....	3,164,000	-----	North Rocky Mountain:		
Wisconsin.....	6,221,000	192,000	Idaho.....	3,632,000	958,000
Total.....	26,545,000	1,484,000	Montana.....	5,870,000	439,000
Central:			Total.....	9,502,000	1,397,000
Illinois.....	3,639,000	-----	South Rocky Mountain:		
Indiana.....	4,306,000	-----	Arizona.....	10,539,000	⁴ 32,000
Iowa.....	3,020,000	-----	Colorado.....	4,434,000	154,000
Kansas.....	3,607,000	-----	Nevada.....	2,724,000	2,000
Kentucky.....	353,000	-----	New Mexico.....	12,656,000	⁴ 121,000
Missouri.....	5,574,000	40,000	South Dakota.....	3,434,000	66,000
Nebraska.....	3,459,000	-----	Utah.....	7,464,000	-----
Ohio.....	2,493,000	-----	Wyoming.....	4,139,000	120,000
Tennessee.....scrip..	300,000	-----	Total.....	45,390,000	495,000
West Virginia.....do.....	150,000	-----	Alaska.....	21,445,000	(²)
Total.....	26,901,000	40,000	Grand total.....	203,004,000	5,306,463

¹ Rough estimate.
² No data.
³ Plus 70,000 Elliott State Forest, secured by exchange sec. 16 and 36's.
⁴ Represents commercial saw timber stands only.
⁵ Includes area secured by exchange.

PRESENT STATUS OF AREAS GRANTED TO STATES

The Alabama Commission of Forestry is making an inventory pursuant to an act passed by the 1927 legislature. This is a rather long job, since no additional funds have been provided for the work. Much of the land has been diverted from purposes for which granted, and many of the sections 16 have been given away outright. The remnant had not been protected or developed as State forests up to 1928, but progress is being made against trespass and larceny and toward insuring that full value is received by the State in case of sale of land or timber. It has been estimated that there may be 270,000 acres of forest land in this remnant.

In Florida all of the land granted except 1,187,342 acres has been conveyed to private owners under various legislative acts. Many of the deeds of conveyance prior to 1877 have never been recorded in the county records, but complete records have been kept since that year. The State forester has no record of the location of forest lands remaining from the original grants. The State has neither protected nor developed the forest lands.

The superintendent of forestry of Louisiana is authorized by law to examine Federal grant lands remaining unsold and to report upon their suitability for State forests. The work has never been done, on account of difficulty in securing the records showing where the lands are located.

The University of Mississippi has title to 23,000 acres designated in 1932 as the University State Forest. The area has been protected from fire since 1927, and the 1932 legislature authorized a contract with the State forestry commission for its protection and management. Mississippi holds about 500,000 acres of common school grant lands, mostly in 640-acre tracts. Much of the area is under lease, but only about one third is used for farming. It is estimated that about 300,000 of the 500,000 acres is forest land. The State forester has proposed a plan of handling whereby ultimate returns from forest products would, he believes, exceed present returns from rents.

In Idaho, of the 3,632,000 acres in original Federal grants, 1,150,000 acres is estimated as having been originally forest land. The State now has 958,000 acres of this forest acreage left, 854,000 acres of which is commercial forest land, among the best in the State. Present values are appreciated by the public. The areas are being protected from fire, and cutting is roughly in accordance with Forest Service standards.

Federal land grants to Montana amounted to 5,870,000 acres, of which 4,000,000 acres are left. In 1927 the legislature provided that State timberland should not be subject to sale, but the timber only. From the best information it appears that of the State land 439,000 acres is classified as forest land, of which 409,000 acres is commercial forest. Little forest land has been lost from Federal grant land through earlier sales. Montana has a fine forest property, largely commercial forest, regulatory laws governing and guarding it, and an appreciation of its value.

Of the 4,434,000 acres of original Federal grant land in Colorado, about 154,000 acres of forest land remains in State ownership. Timber sold from the land in recent years is cut to a 10-inch diameter limit. The State land board has authority to sell timber and other products and may request the advice and assistance of the State forester but is not required to do so. It also has authority to sell any of the public lands of the State not reserved for some special purpose.

In South Dakota, of the original 3,434,000 acres of Federal grant land, 61,000 acres is retained by the State in the Custer State Park, and of this 55,000 acres are forested. The area is well protected and administered as a park. No timber is cut except 250,000 board feet per year for improvements needed. In addition to the above, 11,000 acres of scattered forest land belongs to the State. Sales on these lands, when they are not too far from the headquarters of Custer State Park, are supervised to insure good forestry practice.

In Kansas and Nebraska the Federal grants consisted almost entirely of farm and grazing land.

Although Wyoming received 4,139,000 acres of Federal grant land, the total forest land now owned by the State is 120,000 acres in scattered locations. The State land board has jurisdiction. Timber on school sections within or adjacent to national forests has been marked for cutting by national forest officers. Otherwise there has been no consistent attempt at forest management. Areas of State-owned forest land not included in the national forests are largely unprotected.

The States of Arizona and New Mexico have still in State ownership approximately 153,000 acres of forest land remaining from their Federal land grants. Cutting on State land is handled by the Forest Service at State expense, in the same manner as on national forest land.

Only about 2,000 acres of commercial timberland remains to the State of Nevada from Federal grant land.

In Utah the State has exchanged its forest lands for farm and grazing lands or has sold them as rapidly as possible. Its past policy has not recognized that any of its grant lands have a permanent value for forest purposes and should be managed to that end. Its authorities are now anxious that the Federal Government take over the responsibility for the handling of all remaining State forest land within its boundaries.

In Washington and Oregon, as in other land-grant States, continued use of Federal grant land for timber production was not contemplated. The nature of the grants tended to make considerations of management for timber production very remote and apparently impracticable. In Washington the enabling act stipulated as a condition of sale of grant lands the securing of such a high price that the State still has most of the timberland, and it has had the advantage of rising prices in its sales of stumpage. Efforts to consolidate have been in part successful and will be continued. It is reasonable to expect that eventually the original grants will be put into such shape that they can be managed as State forests. There is little reason to criticise these States for failing in the past to consolidate the forest areas of the grant lands into State forests under management. The opportunity for the profitable management of State forests did not exist.

In the Lake States there is no accurate record as to the part of original Federal grant lands which should be classified as forest land. Forest lands which came by Federal grant have been under forest management only when located within State forests. The latter embrace about 1,434,000 acres of grant lands. These have had the advantage of fire protection, which is steadily increasing in effectiveness and has saved them from being despoiled of their forests as were nearly all the lands which went into private ownership.

The small total of $5\frac{1}{4}$ million acres of forest land left today in State ownership out of over 200 million acres of land of all classes granted to the States is impressive. The enormous publicly owned domain would have returned to present and future generations vastly greater values than have ever been obtained, if a much larger part of it had been kept in public forests under good management. Short-sightedness in both Federal and State Governments must now be acknowledged, however much the wholesale disposal of grant lands may have meant to States in the pioneer days in the way of cash for education and for the development of transportation.

FEDERAL AID TO STATE AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS

The first form of Federal aid to the colleges was in land. In 1862 the Morrill Act offered units of 30,000 acres to each State, according to its numerical representation in both houses of Congress. The offer was conditioned on the establishment of a college of agriculture within a stated time. Scrip was awarded to States in which there was no Federal land. No limitations were imposed as to the price for which the land was to be sold. Eventually every State availed itself of the benefits of this act.

In 1890 the second Morrill Act provided an annual appropriation for the support of each State agricultural college, which appropriation was gradually to rise to the present \$50,000 annual maximum. All the States and three Territories receive this aid.

The total Federal appropriation to land-grant colleges for the fiscal year 1933 was \$2,550,000. The total of endowments built up from the land grants made to the colleges under the act of 1862 is about \$22,000,000, which under ordinary conditions brings a total revenue of about \$1,000,000 per year. The Federal funds provide only for instruction in agriculture, mechanical arts, English, and science. No part of these funds, principal or interest, is to be used for buildings. Here a degree of supervision is indicated which is characteristic of later Federal aid legislation.

In many State colleges of agriculture provision is made for forestry schools or forestry courses along with other lines of education. Thus, forestry has participated indirectly in the support which Federal funds have given to the mother institutions. Forestry courses are now being given in the colleges of agriculture of the States listed below. To designate the nature of the forestry teaching, one or more numbers follow the name of each State. (1) is used to designate instruction leading to a degree in forestry, (2) ranger courses, (3) short courses in forestry, and (4) courses in range management. The list of States is:

Alabama (3); Arkansas (3); Arizona (4); California (1), (3), (4); Colorado (1), (3), (4); Connecticut (1), (3); Delaware (3); Georgia (1), (3), (4); Idaho (1), (3), (4); Illinois (4); Indiana (1); Iowa (1), (3), (4); Kansas (3), (4); Louisiana (1), (3); Maine (1); Massachusetts (3); Maryland (3); Michigan (1), (4); Minnesota (1), (3), (4); Montana (1), (4); Mississippi (3); Nebraska (4); Nevada (4); New Hampshire (1), (3); New York (1), (3), (4); North Carolina (1), (3); North Dakota (3); Oklahoma (3); Oregon (1), (4); Pennsylvania (1), (2), (3), (4); Rhode Island (3); South Carolina (3); South Dakota (3); Utah (1), (3), (4); Vermont (3); Virginia (3); Washington (1), (2), (3); Wisconsin (3).

Just what this Federal aid to agricultural colleges means in dollars and cents to forestry cannot readily be ascertained and will not be here attempted.

By the Hatch Act of 1887, strengthened by the Adams Act of 1906 and the Purnell Act of 1925, there was established a plan to aid in the establishment of experiment stations in connection with the agricultural colleges. The Federal appropriation for State agricultural experiment stations for the fiscal year 1933 was \$4,374,000 a comparatively small part of which is devoted to forestry.

VOCATIONAL EDUCATION

By the Smith-Hughes Act of 1917, a plan was set up for "cooperating with the States in paying the salaries of teachers, supervisors, or directors of agricultural subjects," as well as "in preparing teachers, supervisors, and directors of agricultural subjects and teachers of trade and industrial and home economics subjects." The administration of this act was placed in the hands of the Federal Board of Vocational Education.

It appears that Federal aid has served as a powerful stimulus to the development of State programs of vocational education. The number of federally aided schools increased fivefold during a 9-year period and the number of teachers and pupils about as rapidly. In 1932 there were 1,075,510 pupils and 28,368 teachers.

This activity is significant for its influence upon forestry. In some of the States, as in Georgia, Florida, Mississippi, and South Carolina, the vocational agricultural teachers are carrying on important work in forestry. Many of the schools have established small demonstration forests, which are being developed by the students. In many of these schools, also, effective programs of forestry instruction are being carried on. A very promising field, just beginning to be cultivated, for the extension of forestry interest and practice lies in cooperation between State forestry departments and the vocational agricultural schools.

